DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR LOW FLOW AUGMENTATION AT

HODGES VILLAGE DAM

OXFORD, MASSACHUSETTS

FEBRUARY 1984

US Army Corps of Engineers
New England Division

407-3024

DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR LOW FLOW AUGMENTATION AT HODGES VILLAGE DAM, OXFORD, MASSACHUSETTS

PREFACE

This Draft Environmental Impact Statement addresses the impacts associated with Low Flow Augmentation proposed at the Corps of Engineers operated flood control facility, Hodges Village Dam, in Oxford, Massachusetts. The proposed measure is part of an overall water quality management plan proposed by the State of Massachusetts and the Environmental Protection Agency (EPA) to improve the water quality of the French and Quinebaug Rivers in Massachusetts and Connecticut. Other measures include advanced wastewater treatment improvements at the Webster/Dudley sewage treatment plants and the deactivation of sediments in downstream impoundments of the French River. The impacts of these additional measures and the effects of the combined measures of the overall water quality management plan will be addressed in the forthcoming Environmental Assessment published by EPA and the Massachusetts State Division of Water Pollution Control.

Draft Environmental Impact Statement for Low Flow Augmentation
at Hodges Village Dam and Reservoir, Oxford, Massachusetts

Abstract:

The implementation of a seasonally fluctuating pool behind the existing Hodges Village flood control dam in Oxford, Massachusetts, is proposed to enhance downstream low flows in the French River during summer and early fall. The proposal, when considered together other improvements proposed by the State of Massachusetts and the Environmental Protection Agency, would allow the Class "B" water quality classification to be met during seasonal low flows. Development of the proposed project would require site preparation to minimize debris maintenance problems and maintain water quality. This would involve the removal of 130 acres of wetland, 36 acres of upland, 11 acres of river and 3 acres of disturbed land. This would be replaced, in part, with a 155 acre augmentation pool which would be seasonally drawndown to a 113 acre permanent pool exposing 7 acres of non-vegetated shoreline and lowering the water level in 35 acres of new marsh on the western side of the pool. A 25 acre upland and wetland shrub zone is expected to develop above the augmentation pool perimeter. Project impact to the reservoir's wildlife would be mitigated by the following measures: (1) Enlargement of the permanent pool to reduce the exposed shoreline; and (2) habitat improvements including land reclamation of 9 acres of gravel pits, improvement of 35 acres of marshes, and modifications of the existing forestry management plan. The impacts and mitigation of the reservoir's fish and wildlife resources were analyzed using the Habitat Evaluation Procedures (HEP) developed by the U.S. Fish and Wildlife Service. The analyses determined that about 47% of the lost wildlife habitat would be restored with the proposed mitigation. The riverine warm water fishery upstream of the dam would be replaced with a similar lake fishery. The HEP study indicated nearly a 9-fold increase in fish habitat. No endangered species or historical/archaeological resources would be affected by the proposed project. Recreational use of the area may be enhanced by the project design and wildlife mitigation resources. The aesthetic value of the reservoir area would be reduced by the proposed project and mitigation. Socioeconomic impacts would be short term and confined to the project area.

Send your comments to the Division Engineer by 28 May 1984. If you would like further information of this statement, please contact:

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EXECUTIVE SUMMARY

Project Description:

The proposed action consists of the development of a 155 acre augmentation pool behind the Hodges Village Flood Control Dam and Reservoir to enhance the summer low flows in the French River in Massachusetts and Connecticut. A 113 acre permanent pool would be established at elevation 472 feet NGVD. Spring runoff would be stored during May to raise the augmentation pool to a target elevation range between 510 and 476.0 Ft NGVD. The 475 acre-foot storage would be reduced from 1 June through 31 October to enhance downstream low flows to a minimum of 22 cfs at the Webster, Massachusetts USGS stream gauge. The drawdown would expose about 7 acres of devegetated shores.

Site development preparation would require clearing, grubbing and stripping of 120 acres and clearing and grubbing of an additional 60 acres to elevation 477.5 feet to maintain water quality and minimize maintenance and debris problems. Wetlands and uplands in the reservoir area would be physically altered to enhance wildlife productivity. The existing gates could be modified to afford finer control of the prescribed releases and prevent prolonged inundation of sensitive reservoir habitats. Specific measures would be developed during a future design phase of planning.

Project Need:

The proposed low flow augmentation project is needed to meet instream "Class B" water quality standards in the French River. The Environmental Protection Agency (EPA) and the Massachusetts Division of Water Pollution Control (MDWPC) have recommended that the New England Division undertake a study to determine feasibility of seasonal low flow augmentation storage at the Hodges Village Flood Control Reservoir project. With improvements in wastewater treatment at Webster and Dudley, water quality in the French River would remain below standards without low flow augmentation. The EPA and MDWPC model studies indicate that a minimum flow rate of 22 CFS need be maintained at the USGS gaging station in Webster to meet the State instream standards (MDWPC letter dated 18 May 1983, Section IX).

Alternatives:

The proposed action as described in the project description was determined to be the only feasible alternative to meet instream water quality standards downstream. Nearby Buffumville Reservoir was considered as an alternative surface water source for low flow augmentation but was later eliminated because it would require relocation or other costly modifications to the recreational faclity and impacts to the water quality objectives of the project. Four alternatives to low flow augmentation were evaluated by the Environmental Protection Agency in their 4 March 1982 letter report (see Section IX): nitrification facilities, land application of sewage effluent, additional improvement of the waste water treatment facility, and transfer of wastewater to other facilities. The latter were determined to be not economically and/or technically feasible. The no action alternative was determined to be not acceptable because the instream water quality standards would not be met.

Environmental Impacts

A significant beneficial impact of the proposed project would be the resultant compliance with the instream French River water quality standards during the summer low flows. However, such compliance cannot be achieved solely by the proposed action alone. It must be considered with the measures proposed by EPA for the French River downstream of the Webster/Dudley sewage treatment plants (see Preface).

Achievement of this benefit requires implementation of the augmentation and permanent pool within the presently "dry-bed" flood storage reservoir behind the dam. The implementation of the pools would require removal of 130 acres of red maple, shrub and marsh wetlands, 36 acres of upland pine and oak forests, shrub and grasslands and 11 acres of river. Habitat Evaluation Procedure (HEP) analyses were jointly performed by the Corps of Engineers, Sanford Ecological Services, a Contractor for the Corps, the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife. The study evaluated the potentially affected habitat for the baseline, impact and mitigation conditions for 15 wildlife species and 4 fish species. The basic measure of the wildlife use of the habitat was measured in Habitat Units (HU's) which are a measurement of the quality and quantity of the habitat for a given species. The study indicated that the proposed habitat removed due to the site preparation would remove a total of 680 Habitat Units annualized over the 100 year project life. To mitigate these losses a number of proposals were developed. These included (1) excavation of the banks above the permanent pool to increase the area extent of the permanent pool by 10 acres and decrease the area of exposed banks; and (2) habitat improvements including (a) 9 acres of land reclamation of gravel pits (b) 35 acres of improved marshes and (c) modification of existing forestry management plan for the reservoir. These measures combined would replace 321 average annual HU's. Species such as red-backed vole, muskrat, snapping turtle, American woodcock and belted kingfisher would gain HU's over existing conditions. Other species such as mink, dusky salamander, wood frog, green heron, wood and black ducks, broad-winged hawk, downy woodpecker, yellow warbler and swamp sparrow would experience a net loss.

The removal of 11 acres of existing riverine habitat represent a loss of 37 Habitat Units for the fish species largemouth bass, bluegill, white sucker and bullhead. Over the project life, the new permanent pool would provide 361 average annual HU's for the four species indicating a net gain of 324 average annual HU's. The HEP study indicated no significant changes to the downstream fish habitat over the project life.

No endangered species or historical/archaelogical resources occur within the 180 acre impact area. The future flood control storage is not anticpated to have long term impacts on the vegetation and wildlife in the surrounding area and mitigation lands. No long term impacts to socioeconomic resources are expected. Recreational use of the reservoir may be enhanced by the project design and wildlife mitigation proposals. The aesthetic value of the reservoir area would be reduced by the project and mitigation.

Areas of Controversy:

(1) The mitigation measures included all feasible measures within the contiguous lands of the project. The Corps was unable to provide 100% replacement of the lost wildlife habitat under the existing authorized project. The U.S. Fish and Wildlife Service has indicated that 100% replacement would be required.

(2) The Fish and Wildlife Service during the course of the study has questioned that the improvements justify the removal of habitat behind the dam. However, EPA has maintained that the effect of the combined water quality measures would improve the water quality in the French River in Webster/Dudley area and below.

Unresolved Issues:

The issue of degree of mitigation still remains unresolved. Further discussions are planned with the State and Federal resource agencies to resolve this issue.

Relationship of the proposed project with Federal, State and local laws, plans or regulations:

A decision by the Corps of Engineers will not supersede, take precedence over or conflict with any required, enforceable ordinances or policies applicable to the Corps of Engineers. To the degree that local, State and Federal policies or plans effectively pertain to this project, these have been considered in the development of this report and in the formulation of the proposed plan of action. The reader is referred to Section VI.B. of this document for a list of applicable legislation.

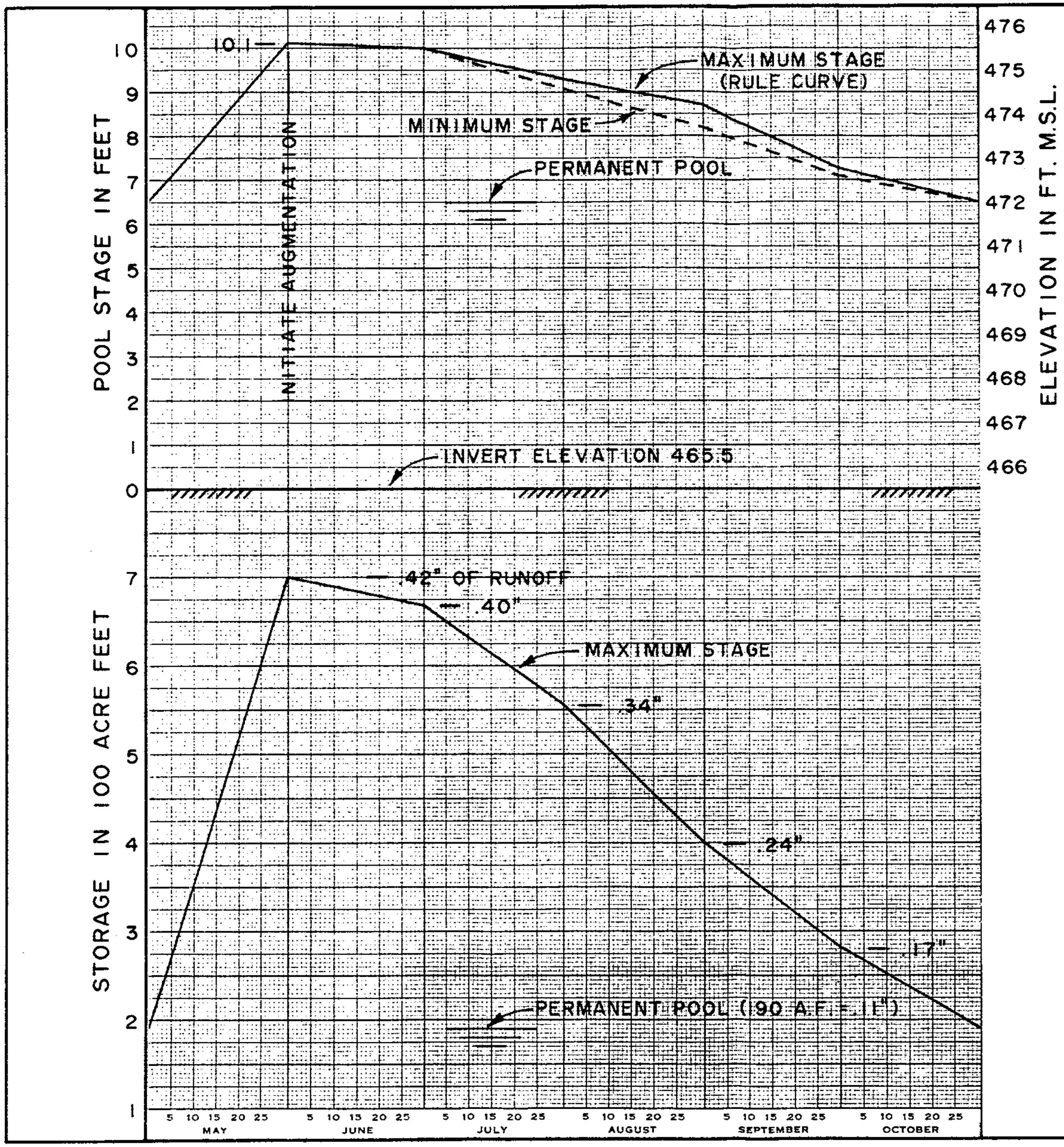
I. PROJECT DESCRIPTION

The proposed action would consist of the creation of a 155 acre seasonally fluctuating impoundment at Hodges Village Dam and Reservoir to maintain a flow of not less than 22 cubic feet per second (cfs), approximately 10,000 gallons per minute, at the French River Stream gage in Webster, Massachusetts from June to November. An analysis of the discharge records at Webster and Hodges Village Dam indicates that with 0.3 inch of runoff in reservoir storage available for flow augmentation, this streamflow requirement would be met with a reliability in excess of 9 out of 10 days from 1 June through 31 October. The 113 acre permanent pool would be at about elevation 472 feet NGVD (stage of 6.5 feet) and have a 190 acre-feet storage capacity, which is equivalent to about 0.1 inch of runoff.

The permanent pool would be filled from 1-31 May for augmentation storage. During the augmentation period (1 June to 31 October), pool elevations would range from a high of 475.6 feet NGVD (1 June) to a low of 472 feet NGVD (31 October). The proposed rate of release is shown in Figure I-1. This would insure sufficient storage to allow flow augmentation throughout the season. The drawdown of water would expose a maximum of 7 acres of shores. The facility would be operated to maintain the permanent pool from 1 November to 30 April A more detailed explanation of the project operation can be found in the Engineering Report for Low Flow Augmentation at Hodges Village Dam and Reservoir (CE, 1984).

To minimize debris maintenance problems and maintain water quality, almost all of the 180 acre impact area would require site preparation consisting of approximately 60 acres of clearing and grubbing and approximately 120 acres of clearing, grubbing, and stripping of loam and forest floor debris down to mineral soil. The extent of these areas are shown on Figure I-2. It is estimated that 265,000 cubic yards of organic material would need to be removed and stockpiled in gravel pits in the reservoir area. Approximately 15,000 c.y. would be used for land reclamation of gravel pits in the reservoir area. The remainder would be sold to entities outside of the project area at the construction contractor's discretion. Modifications to the reservoir's wetland and upland areas would partially mitigate wildlife habitat losses due to project construction. The proposed work includes a modification of one of the two existing 6-foot high by 5-foot wide gates and construction of a small concrete weir (approximately 7' by 3') upstream of the other gates. This would provide finer control of the dam outflows.

To ensure the future integrity of the dam with the proposed seasonal and permanent pool, seepage control measures are also proposed for the downstream toe of the dam. These measures are shown on Figure I-3. This proposed activity would require approximately 1/4 acre. Construction would take place during the spring, summer and fall.



NOTES:

1. BEGIN BUILD-UP OF LOW FLOW AUGMENTATION POOL ON 1 MAY, LIMIT OUTFLOW TO 10 C.F.S.
2. IF POOL STAGE DROPS BELOW MINIMUM STAGE LINE, REDUCE TARGET FLOW AT WEBSTER TO 20 C.F.S.
3. IF FLOWS AT WEBSTER ARE ABOVE 22 C.F.S., MAKE RELEASES TO FOLLOW MAXIMUM STAGE LINE.
4. MINIMUM DISCHARGE SHALL BE 10 C.F.S. OR INFLOW WHICHEVER IS LESS.

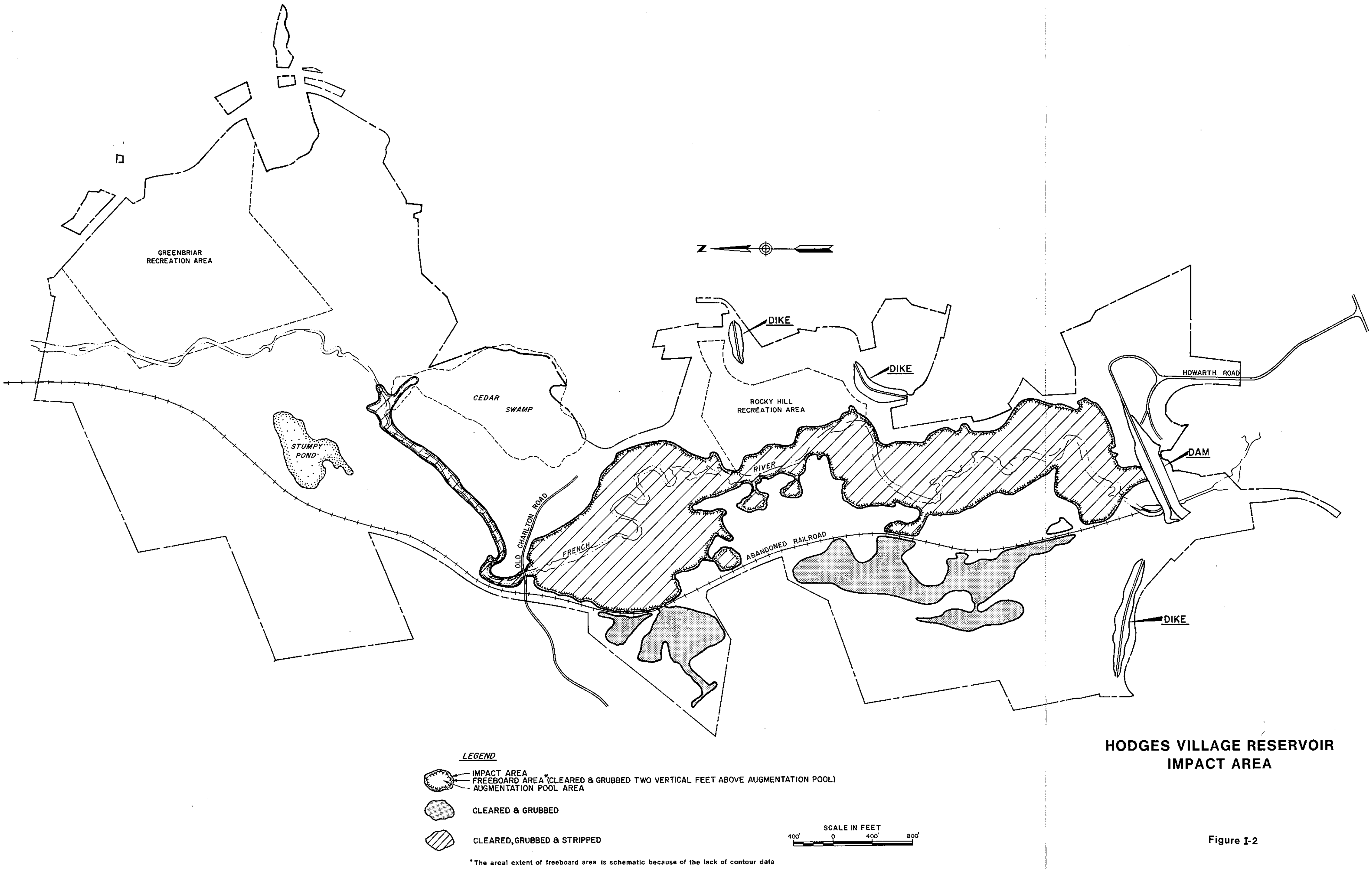
WATER RESOURCES DEVELOPMENT PROJECT

THAMES RIVER BASIN
HODGES VILLAGE DAM

RULE CURVE
22 C.F.S. AT WEBSTER

NEW ENGLAND DIVISION, WALTHAM, MASS.
FEBRUARY 1978

Figure I-1



HODGES VILLAGE RESERVOIR IMPACT AREA

Figure I-2

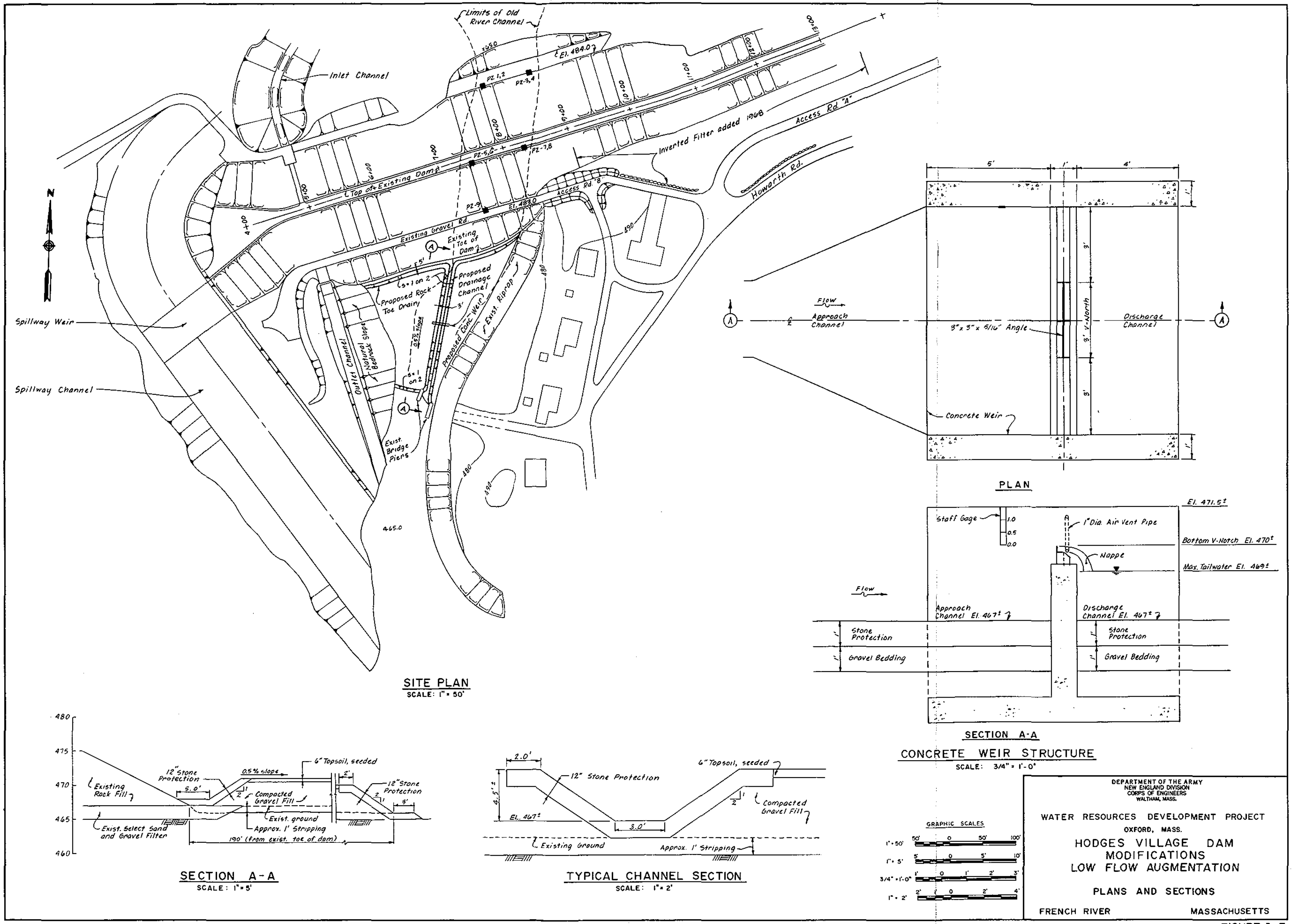

Limits of Old River Channel
Inlet Channel
El. 484.0
PZ-1,2
PZ-3,4
PZ-5,6
PZ-7,8
PZ-9
Top of Existing Dam
Inverted Filter added 1968
Access Rd "A"
Access Rd "B"
Howarth Rd.
Existing Gravel Rd.
El. 483.0
Existing Toe of Dam
Proposed Rock Toe Drain
Proposed Drainage Channel
Proposed Conc. Weir
Exist. Riprap
Outlet Channel
Natural Bedrock Slope
Exist. Bridge Piers
Spillway Weir
Spillway Channel
465.0
490
480
SITE PLAN
SCALE: 1" = 50'
PLAN
Flow
Approach Channel
Discharge Channel
3" x 3" x 5/16" Angle
3' V-Notch
Concrete Weir
SECTION A-A
CONCRETE WEIR STRUCTURE
SCALE: 3/4" = 1'-0"
El. 471.5±
Staff Gage
1" Dia. Air Vent Pipe
Bottom V-Notch El. 470±
Nappe
Max. Tailwater El. 469±
Approach Channel El. 467±
Discharge Channel El. 467±
Stone Protection
Gravel Bedding
SECTION A-A
SCALE: 1" = 5'
12" Stone Protection
0.5% slope
6" Topsoil, seeded
Existing Rock Fill
Compacted Gravel Fill
Exist. ground
Approx. 1' Stripping
Exist. Select Sand and Gravel Filter
190' (from exist. toe of dam)
TYPICAL CHANNEL SECTION
SCALE: 1" = 2'
12" Stone Protection
6" Topsoil, seeded
Compacted Gravel Fill
El. 467±
Existing Ground
Approx. 1' Stripping
GRAPHIC SCALES
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.
WATER RESOURCES DEVELOPMENT PROJECT
OXFORD, MASS.
HODGES VILLAGE DAM
MODIFICATIONS
LOW FLOW AUGMENTATION
PLANS AND SECTIONS
FRENCH RIVER
MASSACHUSETTS

FIGURE I-3

II. PROJECT NEED

The proposed low flow augmentation project is needed to meet instream "Class B" water quality standards in the French River. The Environmental Protection Agency (EPA) and the Massachusetts Division of Water Pollution Control (MDWPC) in a 30 December 1975 letter have recommended that the New England Division undertake a study to determine feasibility of seasonal low flow augmentation storage at the Hodges Village Flood Control Reservoir project. With improvements in wastewater treatment at Webster and Dudley, water quality in the French River would remain below standards without low flow augmentation. The EPA and MDWPC model studies indicate that a minimum flow rate of 22 CFS need be maintained at the USGS gaging station in Webster to meet the State instream standards (MDWPC letter dated, 18 May 1983, Section IX).

III. ALTERNATIVES

A. Background

Efforts to improve water quality in the French River Basin have been underway for a number of years. Agencies involved in this task have included Federal, State, regional and local communities. Information, studies and analysis performed by these participants have provided a significant foundation for the analysis of alternatives. A synopsis of that information is included in a recent letter (December 9, 1983) from the United States Environmental Protection Agency to the United States Fish and Wildlife Service. A copy of that letter and its references are included in Section IX and is incorporated by reference to this Environmental Impact Statement. At the initiation of the low flow augmentation study, both Hodges Village and the nearby Buffumville located on the Little River were considered as potential surface water sources. The primary augmentation source was chosen to be Hodges Village because augmentation could be developed there without significant impact on the authorized purpose or existing recreational facilities. Buffumville's recreational facilities are on the shore of the existing pool; an increase in the pool for augmentation purposes would involve relocation or other modifications to these facilities. Modifications could also impact a prehistoric archeological site located on the shore of Buffumville.

Additionally, water quality tests taken over the past few years have shown nutrient levels in the impoundment at Buffumville to be rather high, particularly levels of phosphorus. Even with proper reservoir preparation such as stripping of organic soil at the reservoir bottom, high inflow nutrient levels in a larger pool could cause algae blooms which would make releases unsuitable for low flow augmentation. Conditions in the existing pool at Buffumville will not adversely affect French River water quality if augmentation is instituted at Hodges Village as proposed, since Little River flows will be small compared to high quality releases from Hodges Village during the critical summer months.

Other surface water source for dilution water in the French River were considered but were eventually ruled out due to insufficient drainage area to provide the necessary flow and/or the adverse recreational impacts. Most of the ponds and lakes in the basin are used for a variety of recreational purposes. This recreation is at its maximum during the summer months in the form of swimming, fishing, and boating. The augmentation flow is required only during the summer months making it necessary to drawdown the lake or pond since none has capacity to store spring runoff. The pond then has no available recharge of water lost during the summer. Most of the lakes in the basin are considered shallow (less than 20 feet) and any further drawdown would adversely affect their recreational value, not to mention water quality (EPA letter dated 9 December 1983).

Several alternatives to low flow augmentation were considered during the planning process by the towns of Webster and Dudley, Massachusetts Division of Water Pollution Control, and the Environmental Protection Agency. These alternatives included: nitrification facilities, land application, additional improvements to wastewater treatment facilities, and transfer of wastewater to other treatment facilities.

These alternatives were eliminated from further study by these planning entities, because of economic constraints or technical considerations (EPA letters, 22 October 1981, 4 March 1982, Section IX). The land application alternatives would require geographical areas that are unavailable. The additional improvements to the wastewater treatment facilities alternative would require the use of unproven technologies. The transfer of wastewater would impact another river. This alternative would only transfer the problem at an increased cost.

B. The Proposed Plan

The proposed plan involves the project as described in Section I above. It includes implementation of the seasonal augmentation pool to enhance low flows downstream of the dam. Development of the pool would require removal of 130 acres of wetlands, 36 acres of uplands, 11 acres of riverine habitats and 3 acres of disturbed land. With the proposed mitigation, this would be replaced with an 103 acre permanent pool, a 17 acre seasonal fluctuation zone above the permanent pool, a 22 acre upland and 3 acre wetland shrub zone surrounding the lake, and 35 acres of wetlands adjacent to the lake. Table III-1 summarized the environmental consequences of the proposed and no action plans.

The net loss of these vegetated cover types would result in a reduction of reservoir's wildlife habitat. Three broad mitigation measures within the reservoir area were evaluated for their potential in mitigating these losses (Appendix A). These include: (1) reduction of the 17 acre fluctuation zone to 7 acres by excavation and, hence, enlargement of the permanent pool by 10 acres; (2) habitat improvements to wetland and upland habitats adjacent and surrounding the pool to enhance

TABLE III-1. COMPARATIVE IMPACTS OF ALTERNATIVES

Resource	Proposed Plan With Mitigation	No Action
Water Quality	Meet instream standards during low flow periods saving downstream communities significant treatment costs; minimal degradation during construction	Cannot technically or economically meet instream standards without project; standards would continue to be violated during low flow periods.
Natural Resources		
Wetland	Net Loss of 92 acres (130-38)	No Impact.
Upland	Net Loss of 5 acres (36-31)	No Impact.
River	Net Loss of 11 acres	No Impact.
Lake	Net Gain of 113 acres	No Impact.
Wildlife	Net Loss of 359 Habitat Units (680-321)	No Impact.
Fisheries	Net Gain of 324 Habitat Units (361-37)	No Impact
Endangered Species	No Impact	No Impact
Historical/ Archaelogical	No; Impact within pool area; construction access may impact Sites in adjacent uplands.	No Impact
Recreational	Increased opportunity for boating and potential for increased woodcock hunting, fishing (once fish and wildlife populations stabilize), and swimming.	No Impact
Aesthetics	Loss of natural vegetation; and fluctuation zone around lake perimeter would reduce aesthetic quality of area.	No Impact.
Socio-economic		
Noise	Increased noise during construction phase	No Impact
Air	Increased dust during construction phase	No Impact.
Traffic	Increased traffic during construction phase	No Impact.
Employment	Increase of jobs during construction phase.	No Impact.

wildlife carrying capacity; and (3) inkind replacment of emergent and shrub wetlands in the form of 25 acres of new islands and peninsulas located within the permanent pool.

Costs for implementation of these measures were developed. The measures were then compared on the basis of their cost-effectiveness in replacing the habitat losses. This analysis showed that a maximum of 507 lost wildlife Average Annual Habitat Units could be mitigated for within the reservoir area. Costs to achieve this level, however, are estimated to be $2.6 million.

Further evaluation revealed that implementation of first two measures, i.e., reducing the stripped augmentation pool and habitat improvements of marsh and upland areas replaced a substantial portion of the lost habitat. Costs for these measures are estimated to be $600,000 and 321 wildlife Average Annual Habitat Units were provided.

On the basis of this analysis, implementation of the two measures (1 and 2) would replace about 47% of the lost Habitat Units in a more cost-effective manner.

No endangered species or historical/archaelogical resources occur within the impact area. More detailed impact and mitigation analyses may be found in Section V, and Appendices A and B of this report.

C. No Action (Without Conditions)

Without the proposed action the instream water quality of the French River would not be met even with the increased wastewater treatment planned for Webster and Dudley. Technology which is cost efficient presently does not exist which would allow for wastewater treatment alone to meet State standards. This alternative would also cause no impacts to the resources at Hodges Village Reservoir.

IV. ENVIRONMENTAL SETTING

A. Natural Resources

1. Location.

Hodges Village Dam is located on the French River about 15 miles upstream of its confluence with the Quinebaug River in the south central Massachusetts town of Oxford (Figure IV-1). The French River mainstem originates at the outlet of Rochdale Pond in Rochdale which receives drainage from the headwater streams Town Meadow, Bantons and Grindstone Brooks in Leicester (Figure IV-2). The mainstem continues in a southerly flow for a distance of 23 miles through the towns of Oxford, Webster and Dudley Massachusetts and Thompson, Connecticut, to its confluence with the Quinebaug River in North Grosvenordale.

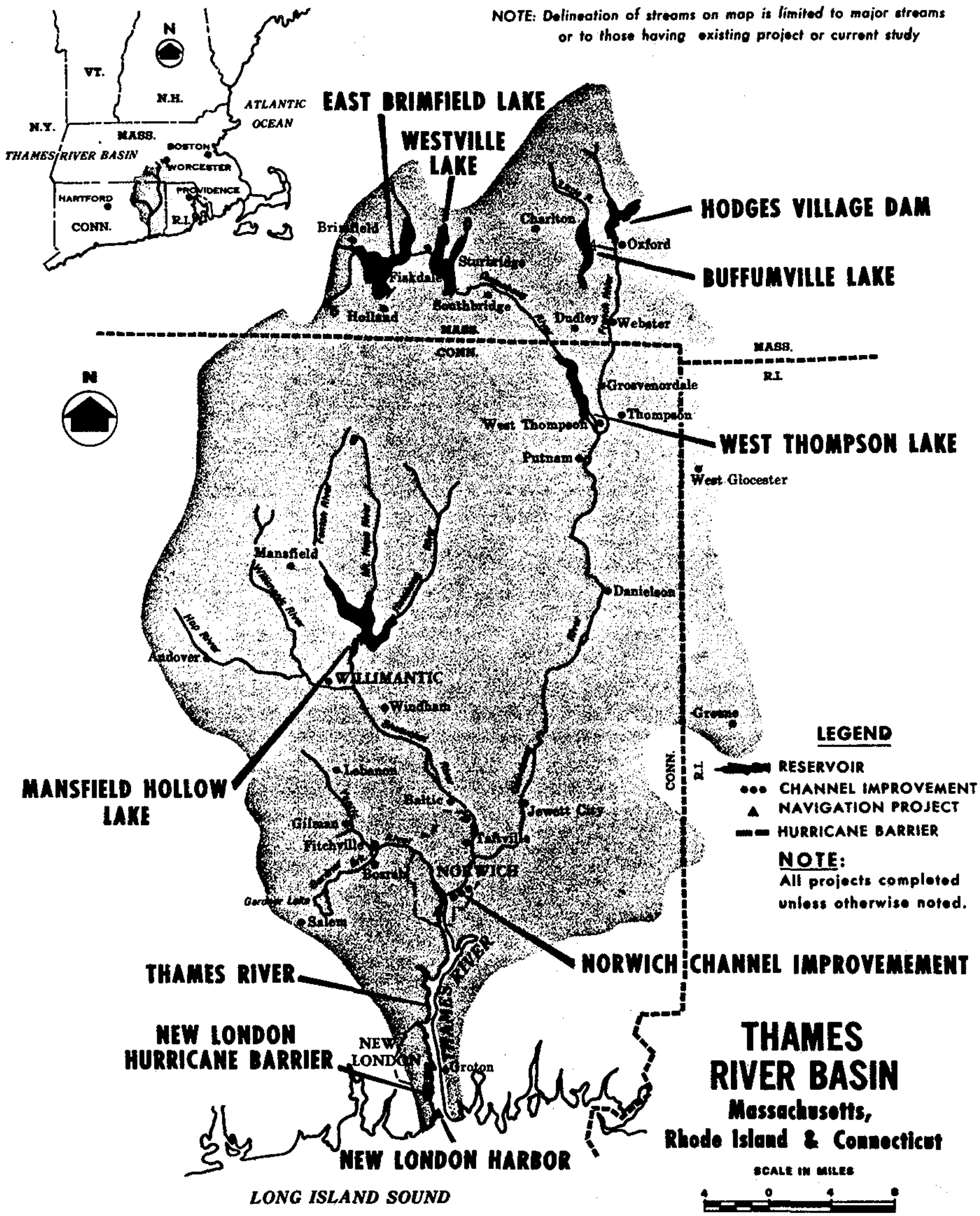
The Quinebaug River is a tributary of the Shetucket River, which joins with the Yantic River in Norwich to form the Thames River. The Thames River estuary flows into Long Island Sound near New London and Groton, Connecticut (Figure IV-1).

2. Topography.

The French River Valley is located in the New England upland section, near the western edge of the seaboard lowland section of the New England physiographic province. The terrain surrounding Hodges Village Dam and Reservoir can be generally described as hilly with moderate relief (Figure IV-3). Elevations in the vicinity of the reservoir range from about 470 feet NGVD in the streambed at the base of Hodges Village Dam to about 840 feet NGVD on Taft Hill, south of Oxford, overlooking the Reservoir. North of the project, the French River flows through a generally narrow valley flanked by high, steepsided hills. Within and below the reservoir area, the valley widens and is partially lined with terraces.

3. Geology.

The bedrock along the dam site varies from a finely-crystalline, mica schist on the area of the right abutment to a granite-gneiss along the valley bottom. The bedrock depth at the dam site varies from outcrops on or near the surface of the right abutment to over 100 feet below the existing valley floor on the left side of the valley. The overburden in the vicinity of the dam consists of slightly silty sands and gravels which were deposited as outwash by the receding Pleistocene glaciers. Till generally blankets the hills and ridges except for some of the upper slopes where rock is exposed. These coarse-grained materials are good sources of gravel and were actively mined in two pit locations within the project area and continue to be mined on lands immediately adjacent to the project area.



NOTE: Delineation of streams on map is limited to major streams or to those having existing project or current study
VT.
N.H.
N.Y.
MASS.
ATLANTIC OCEAN
BOSTON
WORCESTER
PROVIDENCE
THAMES RIVER BASIN
HARTFORD
CONN.
R.I.
EAST BRIMFIELD LAKE
WESTVILLE LAKE
HODGES VILLAGE DAM
BUFFUMVILLE LAKE
WEST THOMPSON LAKE
MANSFIELD HOLLOW LAKE
THAMES RIVER
NEW LONDON HURRICANE BARRIER
NEW LONDON HARBOR
NORWICH CHANNEL IMPROVEMEMENT
Brimfield
Fiskdale
Holland
Sturbridge
Southbridge
Charlton
Oxford
Dudley
Webster
Grosvenordale
Thompson
West Thompson
Putnam
West Glocester
Mansfield
Danielson
Andover
WILLIMANTIC
Windham
Greene
Lebanon
Baltic
Jewett City
Gilman
Fitchville
Taftville
Bozrah
NORWICH
Salem
NEW LONDON
Groton
THAMES RIVER
LONG ISLAND SOUND
MASS.
CONN.
R.I.
LEGEND
RESERVOIR
CHANNEL IMPROVEMENT
NAVIGATION PROJECT
HURRICANE BARRIER
NOTE:
All projects completed unless otherwise noted.
THAMES RIVER BASIN
Massachusetts, Rhode Island & Connecticut
SCALE IN MILES
4 0 4 8

Figure IV-1

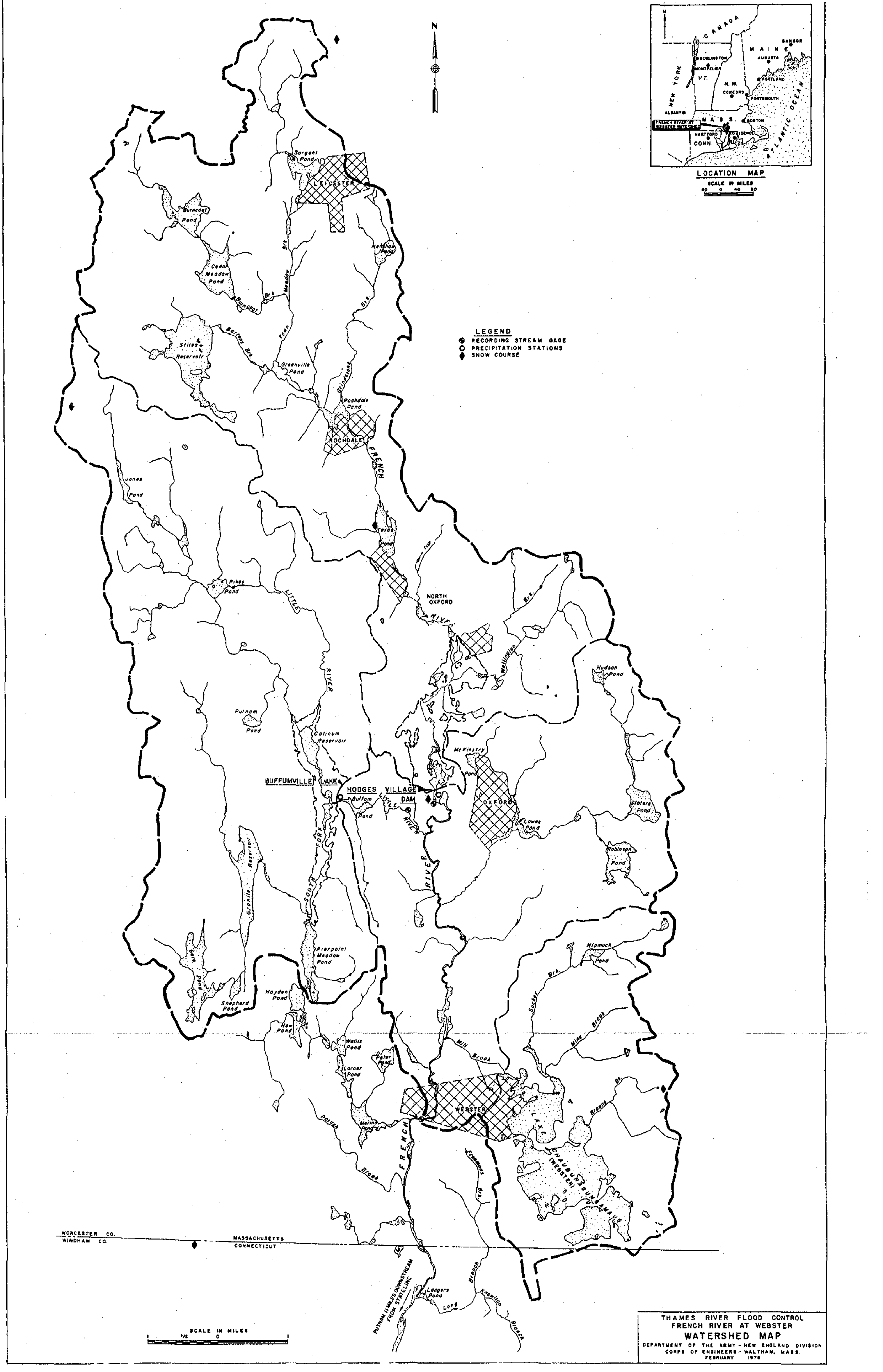

THAMES RIVER FLOOD CONTROL
FRENCH RIVER AT WEBSTER
WATERSHED MAP
DEPARTMENT OF THE ARMY - NEW ENGLAND DIVISION
CORPS OF ENGINEERS - WALTHAM, MASS.
FEBRUARY 1976
LEGEND
RECORDING STREAM GAGE
PRECIPITATION STATIONS
SNOW COURSE
LOCATION MAP
SCALE IN MILES
SCALE IN MILES
N
LEICESTER
ROCHDALE
NORTH OXFORD
OXFORD
WEBSTER
BUFFUMVILLE LAKE
HODGES VILLAGE DAM
Sargent Pond
Burncoat Pond
Cedar Meadow Pond
Stiles Reservoir
Greenville Pond
Rochdale Pond
Jones Pond
Pikes Pond
Texas Pond
Putnam Pond
Colicum Reservoir
Buffum Pond
McKinstry Pond
Lowes Pond
Hudson Pond
Slaters Pond
Robinson Pond
Granite Reservoir
Pierpoint Meadow Pond
Hayden Pond
Shepherd Pond
New Pond
Wallis Pond
Peter Pond
Lorner Pond
Nipmuck Pond
Merino Pond
Langers Pond
FRENCH RIVER
LITTLE RIVER
SOUTH FORK
Mill Brook
Sucker Brook
Mine Brook
Potash Brook
Long Branch
Knowlton Branch
WEBSTER LAKE
CHAUBUNAGUNGAMAUG
WORCESTER CO.
WINDHAM CO.
MASSACHUSETTS
CONNECTICUT
PUTNAM 11 MILES DOWNSTREAM FROM STATELINE
CANADA
MAINE
NEW YORK
VT.
N.H.
MASS.
CONN.
R.I.
ATLANTIC OCEAN
BANGOR
AUGUSTA
BURLINGTON
MONTPELIER
PORTLAND
CONCORD
PORTSMOUTH
ALBANY
BOSTON
HARTFORD
PROVIDENCE
FRENCH RIVER AT WEBSTER WATERSHED

Figure IV-2

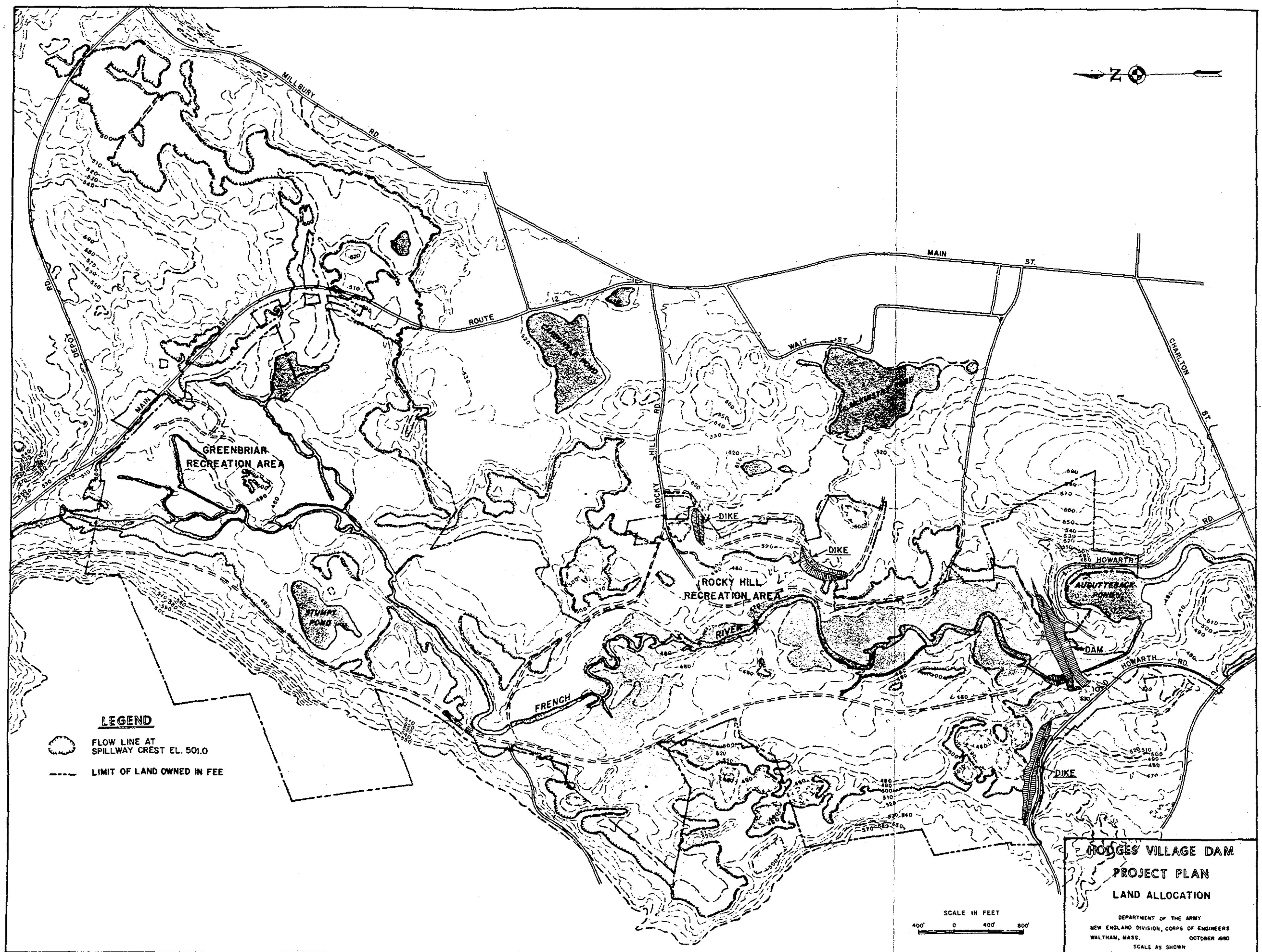

HODGES VILLAGE DAM
PROJECT PLAN
LAND ALLOCATION
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. OCTOBER 1980
SCALE AS SHOWN
SCALE IN FEET
400' 0 400' 800'
LEGEND
FLOW LINE AT SPILLWAY CREST EL. 501.0
LIMIT OF LAND OWNED IN FEE
N
MILLBURY RD
MAIN ST.
ROUTE 12
WAIT ST.
CHARLTON ST.
DEPOT RD
MAIN ST.
ROCKY HILL RD
HOWARTH RD.
GREENBRIAR RECREATION AREA
ROCKY HILL RECREATION AREA
STUMPY POND
AUBUTTEBACK POND
FRENCH RIVER
DIKE
DIKE
DIKE
DAM

Figure IV-3

The soil in the area of the French River valley that was underlain by ice-contact stratified drift is well-drained and nutrient deficient. The alluvium is well-drained, but more fertile except in the swamp deposits and small wetlands scattered throughout the region. Soils are of the Merrimac-Hinckley-Windsor association on hillsides with Aubres and muck and peat occurring in the lowlands.

4. Vegetation.

About two-thirds of the land in the town of Oxford is wooded, including the project area. Most of the upland woods have a closed canopy with small to medium-sized trees indicating relatively recent regeneration from farm land. The upland woods occur on small, often steep-sided hills with well-drained, sandy soil. White pine and white oak predominate with smaller numbers of red oak in many areas and frequent pitch pine on the driest sites. Gray birch, quaking aspen, and scrub oak also occur in these woods. The wetlands are more varied in physical characteristics and in plant species composition. Red maples predominate in the wetlands and are accompanied by meadowsweet, black alder, speckled alder and other shrubs. Black willow, red maple, gray birch and redosier dogwood are the common woody plants along the river and stream banks. Major species of the marshes are rushes, spikerush, wool-grass, cattail and tussock sedge. Redosier dogwood dominates the shrub swamps. The meadows and shrubby meadows occur on dry sandy soil and consist mostly of little bluestem, asters, goldenrods, milkweeds, meadowsweet, staghorn sumac, blackberries, sweet fern, small white pines and quaking aspen.

Vegetation cover types are named following the classification system presented in "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin et al., 1979). Wetland cover types represented on the site are (1) palustrine deciduous forested wetlands (PF01), (2) palustrine needle-leaved evergreen forested wetlands (PF04), (3) palustrine scrub-shrub wetlands (PSS), and palustrine emergent wetlands (PEM). Upland cover types represented on the site are (1) upland deciduous forest (UF01), (2) upland needle-leaved evergreen forest (UF04), (3) upland scrub-shrub (USS), and (4) upland forb/grassland (UF/G). In addition, the French River was classified as riverine and the gravel pits, dirt roads, etc. are classified as disturbed.

Of the 871 acres of land held in fee and the 264 acres of flowage easements at Hodges Village Reservoir, a total of 794 acres were mapped for the purposes of this study. The distribution of the cover types are exhibited in Figure IV-4. Table IV-1 indicates the dominant vegetation and acreage of each cover type. Upland oak forest followed by upland pine, red maple forest and shrubs wetlands are the most dominant vegetated cover types in the reservoir. Two noteworthy cover types in the reservoir area include the Atlantic White Cedar Swamp (PF04) and two quaking bogs (PSS). Both have unique plant associations and are considered unusual in the State of Massachusetts. The location of these areas are indicated in Figure IV-4. A more detailed description of the vegetation that occurs in

TABLE IV-1
DOMINANT VEGETATION AND AREA OF THE COVER TYPES
THAT OCCUR AT HODGES VILLAGE RESERVOIR

Cover Type (cover type code)*	Dominant Vegetation	Area (acres)	%
Palustrine Broad-Leaved Deciduous Forest (PFO1)	Red Maple	65	8
Palustrine Needle-Leaves Evergreen Forest (PFO4)	Altantic White Cedar	23	3
Palustrine Scrub/Shrub - bog (PSS)	Leatherleaf,swamp laurel, Sheep laurel, high-bush blueberry	17	2
Palustrine Scrub/Shrub-non-bog (PPS)	Swamp dogwood, Buttonbush, willow, arrowwood	45	6
Palustrine Emergent Marsh (PEMS)	Tussock sedge	10	1
Palustrine Emergent Marsh (PEMM)	<u>Juncus</u> rushes, spikerush, wool-grass, reed grass, cattail	18	2
Upland Broad-leaved Deciduous Forest(UFO1)	Mixed oaks	384	48
Upland Needle-Leaved Evergreen Forest(UFO4)	White Pine	77	10
Upland Scrub/Shrub (USS)	Sweet fern, Sheep laurel, meadowsweet	17	2
Upland Forb/grass (UF/G)	Grasses	25	3
Riverine (RIV)	Open water	13	2
Disturbed Area	Gravel pits, roads	100	13
TOTAL		794	100

* See Appendix A and Cowardin *et al.* (1979) for explanation

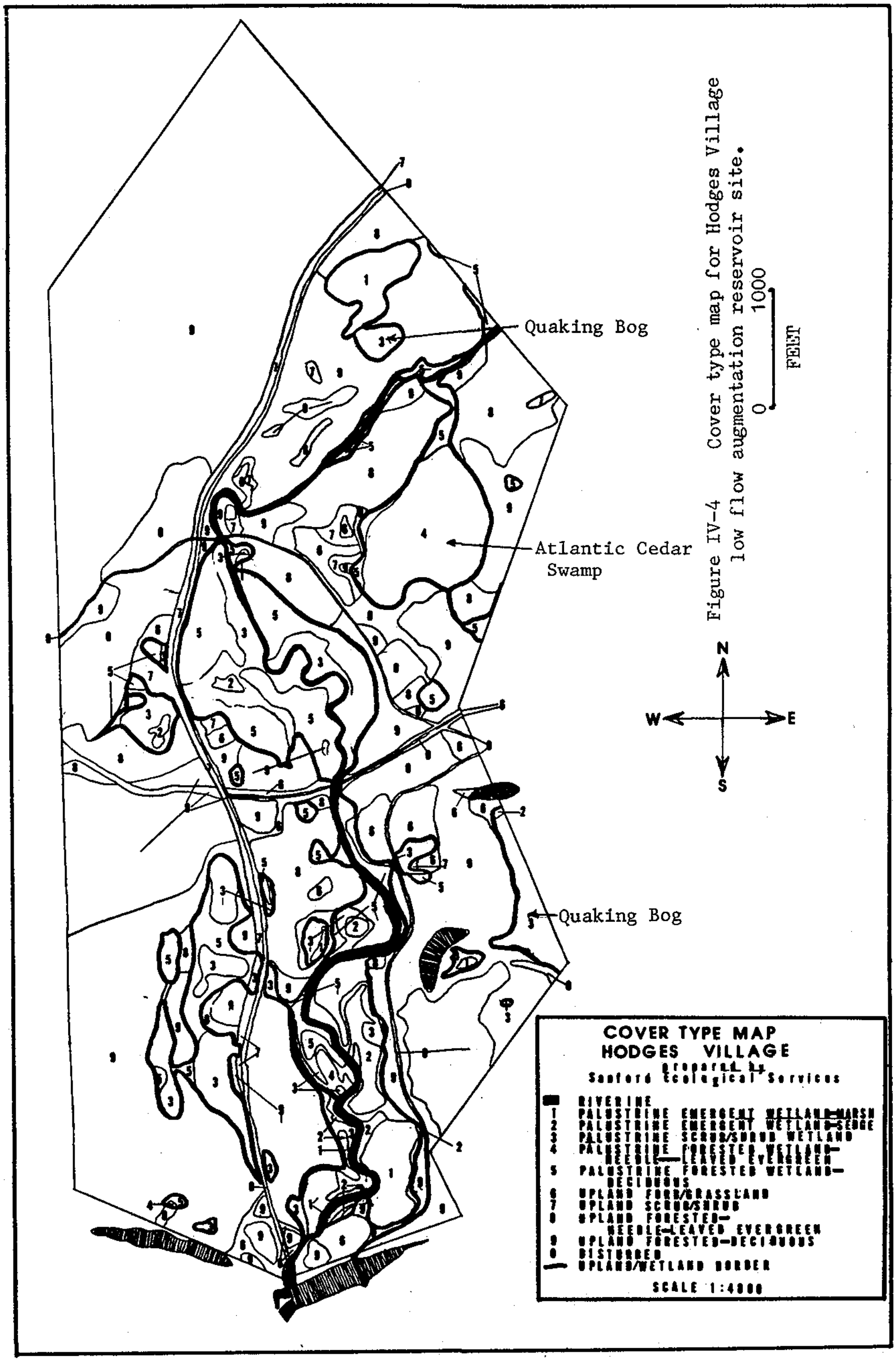


Figure IV-4 Cover type map for Hodges Village low flow augmentation reservoir site.

each cover type may be found in Appendix A. As indicated in Figure IV-4, the wetland cover types are generally associated with the French River.

The pattern of wetland cover types correlate with topography and moisture gradients. Riverine and palustrine emergent wetland marsh of course constitutes the wettest environments since they are permanently inundated. Palustrine emergent wetland sedge areas occur primarily in the lower basin adjacent to and up gradient of the marsh (Figure IV-4). This area remains inundated longer than other seasonally inundated cover types. The palustrine scrub/shrub cover type (non-bog) is located around the perimeter of the emergent wetlands and also adjacent to the river in the upper basin (Figure IV-4). It is inundated for almost as long as the sedge wetland. The palustrine deciduous forested wetland is inundated for the shortest period of time. Red maple is not tolerant of prolonged inundation. The pattern of upland cover types is probably a product of past forestry operations and other sources of disturbance.

5. Forestry Management.

A forestry management plan for the reservoir area has been published as Appendix B of the Hodges Village Master Plan (Corps of Engineers (CE), 1981). Briefly the plan basically consists of thinnings and timber harvests designated for specific stands. Thinnings are used to increase growth in stagnated stands, to maintain stand density and to erected a diversity of species and age classes. Timber harvests are designed to increase tree vigor, improve form, release suppressed trees, harvest mature timber and otherwise enhance the productivity of forest species desirable for aesthetics, wildlife and forest products. Harvests are planned for both the upland white pine and oak forest cover types. The long term result of the management plan would effectively allow the pine stands to regenerate to oak and oak stands to pine. This should occur over a 50 year period. The harvested trees are expected to be marketed as sawtimber (pine) and fuel wood (oak) under a special permit program.

6. Wildlife.

The above enumerated vegetated cover types provide habitat for a wide variety of resident and transient wildlife common to New England inland wetlands and uplands. Typical species include mammals such as mink, muskrat, beaver, fox, raccoon and white-tailed deer; a variety of amphibian/reptiles including dusky salmander, eastern newt, frogs, turtles and snakes; and a wide variety of birds such as great blue heron, green heron, ducks, Canada goose, hawks, owls, American woodcock, belted kingfisher, woodpeckers, shore birds, and numerous songbirds. A list of species which have been confirmed or considered likely to occur at Hodges Village Reservoir is presented in Tables 2-1 and 2-2 of Appendix A.

These species are distributed according to the cover types that provide them with the necessary life requisites such as food, cover, and nesting and brooding sites. Tables A-1 through A-18 of Appendix A exhibit the wildlife species (listed in Tables 2-1 and 2-2) that use each cover type described above in terms of reproductive and feeding requirements. The tables also indicate the location used in each cover type for nesting and feeding as well as community trophic level. The actual geographical distribution of the species may be ascertained by cross referencing the tables with Figure IV-4.

It is evident from the tables that many of these species are multi-cover types users in that two or more cover types can provide them with suitable reproductive and feeding habitat. Downy woodpecker, for example uses the "dead wood" tree layer of the palustrine and upland deciduous and evergreen forests for both reproduction and feeding. Likewise, mink can use virtually all the wetland cover types for its foraging activities. Muskrat, on the other hand, are generally restricted to riverine and herbaceous marsh habitat. Some cover types do not provide the complement habitat necessary for a species to successfully "live." Species such as wood duck, woodcock and broad-winged hawk require two or more cover types in combination to fulfill their reproductive and feeding needs.

The quality of wildlife habitat in the reservoir was evaluated using Habitat Evaluation Procedures (HEP) described in Ecological Services Manual (ESM) 102 (U.S. Fish and Wildlife Service (FWS), 1980). The procedures make use of species-habitat relationships such as food, cover and reproduction requirements to evaluate habitat quality for selected representative evaluation species. The quality is expressed as an index (Habitat Suitabilty Index or HSI) which is a comparison of existing conditions with those that are considered optimum for the species. The 0 - 1.0 scale of the index is linearly correlated with the population levels with "0", indicating a habitat of no suitability and "1.0" indicating of high suitability which is equivalent to maximum carrying capacity. The index is determined with the use of Habitat Suitability Index models (FWS, 1981) which key in on habitat variables that are related to the population levels a habitat can support, for example, the availability of appropriate nesting sites on trees for wood duck. Factors which could stress populations can be incorporated into the models. The stress caused by flood control operations can be incorporated into the index with such variables as degrees of saturated soils, lack of trees, or the lower shrub heights due to saturated soils or ice action during winter. The relationship of these variables to the actual population levels are documented in studies cited in the models. The HSI value can be multiplied by the acreage of a given cover type or habitat to result in a "Habitat Unit (HU)" which is a numeric expression of the quality and quantity of habitat available to a species in a given cover type. A more detailed description of the generation of the HSI's and HU's may be found in ESM 102 and 103 (FWS, 1980; 1981).

To evaluate the potentially impacted habitat at the reservoir representatives from the Corps, Sanford Ecological Services (a Contractor for the Corps), U.S. Fish and Wildlife Service and Massachusetts Division of Fisheries and Wildlife chose 15 evaluation species from candidate species listed in Table 2-1, and 2-2 of Appendix A. Because nearly 80% of the 180 acre impact area consists of wetlands or river, the number of evaluation species were skewed towards wetland cover types. A more detailed description of the species selection process may be found in Section 4 of Appendix A.

Table IV-2 displays the chosen evaluation species cover types used by each species and calculated HSI's of the total habitat, total habitat area and HU's in the 794 acre study area. All species occur in two or more cover types. Fourteen of the fifteen occur in a variety of wetland cover types. American woodcock is the only exclusive upland cover type user. However, the red-backed vole, dusky salamander, wood frog, wood duck, broad-winged hawk, downy woodpecker and yellow warbler can also use upland cover types for some of their life requisites. Table IV-2 also exhibits the quality and quantity of habitat for each species in terms of HSI's, acres, and HU's for the 794 acre study area. In terms of quality, the reservoir supplies high quality habitat to mink, wood frog, green heron, broad-winged hawk and downy woodpecker. If the HSI interval 0.34 - 0.66 is construed as average quality habitat, the reservoir provides this to muskrat, black duck, yellow warbler and swamp sparrow. By the same token, if the HSI below 0.34 is construed to be fair to poor, the reservoir supplies this quality to red-back and vole, snapping turtle, American woodcock, and belted kingfisher. Admittedly, these subdivisions are arbitrary and do mask higher and lower suitabilities found in individual cover types. However, the purpose of the discussion is to give the reader a "feel" for the quality of the habitat in general. The reader is referred to Section 7 of Appendix A for a more detailed discussion of how the habitat quality of each cover type was determined.

The resultant HU's are displayed in the final column of Table IV-2. The HU, as briefly described above, is a function of the quality index and area of each cover type. The highest values occur for the species with the highest HSI's and habitat acreages. Thus, the broad-winged hawk and downy woodpecker apparently have the highest number of HU's of the evaluation species as a result of the large acreage of habitat in the reservoir as well as its high quality. The majority of acreage for both species consists of the upland forested cover types which makes up about 58% of the total 794 cover study area. On the other hand, species such as muskrat, snapping turtle, belted kingfisher and yellow warbler have the lowest overall HU's in the study area. The limited acreage of their cover types combined with lower suitability indices reduced the HU values for these species. The remaining species had an intermediate number of HU's. Red-backed vole, dusky salamander, black duck, wood duck, and American woodpecker were primarily limited by relatively low HSI's. The limiting factors in each cover type which reduced the HSI's are discussed in Section 7 of Appendix A.

7. Fisheries.

The fisheries habitat at the Hodges Village Reservor consists of the French upstream and downstream of the dam. Both habitats have the potential for impact and will be considered below, separately.

TABLE IV-2
COVER TYPE USE, BASELINE HABITAT SUITABILITY INDICES (HSI), HABITAT AREA, AND HABITAT UNITS (HU'S) OF THE WILDLIFE EVALUATION SPECIES FOR THE 794 ACRE STUDY AREA AT HODGES VILLAGE RESERVOIR

Evaluation Species	Cover Types[1] Used	Mean Weighted HSI	Area of Total Habitat(acres)	HU[2]
Red-backed vole	PF01 PSS UF01 USS	0.30	528	159.6
Mink	PF01 PEMM PF04 PEMS PSS RIV	0.84	466 [3]	389.1
Muskrat	RIV PEMM PEMS	0.49	41	20.0
Dusky salamander	PF01 UF04 PF04 PSS UF01 RIV	0.17	624	106.2
Wood Frog	PF01 UF01	0.83	449	372.8
Snapping Turtle	PF01 PEMS PSS RIV PEMM	0.20	168	33.8
Black duck	PF01 PSS PEMM PEMS	0.39	155	60.7
Wood duck	UF01 PEMM PF01 PEMS PSS RIV	0.16	552	88.3
Broadwinged hawk	PF01 UF04 PF04 PSS UF01 UF/G	1.0	653	653.0
American woodcock	UF01 PSS PF01 UF/G	0.34	536	182.2
Belted kingfisher	RIV PSS PEMM PF01 PEMS PF04	0.19	191	36.5

TABLE IV-2 (Continued)
COVER TYPE USE, BASELINE HABITAT SUITABILITY INDICES (HSI), HABITAT AREA, AND HABITAT UNITS (HU'S) OF THE WILDLIFE EVALUATION SPECIES FOR THE 794 ACRE STUDY AREA AT HODGES VILLAGE RESERVOIR

Evaluation Species	Cover Types[1] Used	Mean Weighted HSI	Area of Total Habitat(acres)	HU[2]
Downy woodpecker	PF01 UF01 PF04 UF04	0.76	549	418.0
Yellow warbler	PSS USS	0.50	79	39.3
Swamp sparrow	RIV PSS PEMM PF01 PEMS PF04	0.67	178	119.1

1. See Table IV-2 for cover type codes.
2. Habitat Units (HU's) may be slightly different than the product of mean HSI and habitat area due to rounding.
3. Includes upland habitat surrounding wetland.

a. Upstream

The French River within the reservoir area upstream of the dam is situated in a relatively wide flood plain and has strong meandering characteristics. The mainstem ranges about 20 - 50 ft wide and 2 - 6 feet deep. The 2.5 miles of river within the dry-bed reservoir drops at a rate of about 1.3 ft per 1000 ft. Average current water velocities range from negligible to 4 cm/sec, during the summer low flows of 3 - 4 cfs, to 15 cm/sec, during the May - June average flows of 47 cfs. Substrates in the upper reservoir area are primarily sand, gravel or boulders and are bedrock whereas in the lower reservoir area are predominantly muddy. Instream cover is primarily made of debris, brush, logs, and boulders with some aquatic vegetation and undercut banks. The average percent cover usually varied from 20 - 25%.

Submergent vegetation was generally made up of water celery (Vallisneria), coontail (Ceratophyllum sp.), watermilfoil (Myriophyllum sp.) and pondweed (Potamogeton sp.) which were generally covered with a periphyton community. The upper and middle reservoir has a well developed streambank with thick shrub vegetation primarily consisting of such riparian species red osier dogwood, arrowwood, willow and buttonbush. The overstory was primarily made up of oak, pine, hemlock and maple and provided a high degree of canopy closure. The riverine the lower reservoir flows through a wide herbaceous emergent marsh habitat primarily consisting of spikerush, barnyard grass, wood-grass, soft-stem Juncus and an occasional buttonbush. The river supports populations of freshwater mussels, snails, and crayfish which are often the prey of mink and otter.

The Massachusetts Division of Water Pollution Control (MDWPC) has designated the French River a Class "B" stream. Monitoring by the Corps and the MDWPC indicates that dissolved oxygen and pH criteria for "B" classification are not always met (CE,1983, MDWPC 1975 a,b; 1978; 1983). The proposed improvements to the Leicester Sewage Treatment facility upstream of the reservoir should make the dissolved oxygen violations less frequent. The origin of the pH violations are unknown although acid precipitation and low alkalinity may be factors. The water temperatures in the river rarely exceed class "B" warm water fishery standards (83°F). Instream measurements taken on hot days in August did exceed 77° F. Exposed shallow backwater areas can reach as high as 83°F in the lower reservoir where no overstory exists. The turbidity of the French River over six years of sampling had been consistently low, ranging from 2.1 - 2.3 Jackson Turbidity Units.

The fish community in the reservoir was sampled during the summer of 1983 with a boat electroshocker by personnel from the Massachusetts Division of Fisheries and Wildlife and the Corps. The community in the upper reservoir area was made up of warm water species and predominantly consisted of white sucker, followed by golden shiner, pumpkinseed, largemouth bass and some chain pickerel, fallfish and brown and yellow bullheads. The community in the lower reservoir river generally consisted of the same species and was dominated by pumpkinseed, golden shiner, largemouth bass, sucker and pickerel. Also, bluegills were present and fallfish were absent. Table 1 of Appendix B displays the distribution of the species in terms of number and biomass. Four legal-sized largemouth bass (12" total length) were collected from this upstream section which made up about 13% of the total catch for this species.

b. Downstream

The downstream study area consists of the French River, to its confluence with the Lowes Brook which is about 2.7 miles downstream of the dam site. This reach was determined by the HEP study team to be the downstream limit of influence that the low flow augmentation (from 3 cfs to 10 cfs) would have on the local fish community. Downstream, the river receives flows from the Little River, which is regulated by the Corps' Buffumville Flood Control project, and small wetlands associated with the mainstem and Lowes Brook. The team concurred that below the confluence of Lowes Brook, the combined inflows of tributary streams, wetland drainages and land runoff would exert a greater influence on the fish community in that reach of the French River than the augmented flows acting alone.

The general fish habitat is similar in appearance to the river in the middle and upper reservoir area. Stream widths range from about 30 - 60 ft and depths 2 - 6 feet. The river falls about a total of 2 feet over the 2.7 mile study area. However, this occurs in discrete areas which lie between relatively flat reaches of river. Water current velocities ranged from 3.7 - 9.3 cm/sec in the summer low flow conditions (3 - 13 cfs). Instream current velocities during May and June range from 2 to 26 cm/sec during the 47 cfs average flow. Areas in the lower downstream study area also receive flows from the releases at Buffumville. As a result of these higher velocities, the substrate in this reach is generally sand and gravel.

Instream cover, ranging from 15 - 73%, was higher than the upstream values. The species of instream and riparian vegetation that were described for the upper and middle reservoir area are also common in the downstream study area. Some areas had greater development of undercut banks and shrub overhang than the reservoir areas. A number of wetland backwater areas with wetland herbaceous and shrub vegetation occur along this highly meandering downstream reach.

The water quality parameters in the downstream study area would essentially be the same as those discussed for the reservoir riverine system.Benthic samples taken in 1974 indicated that the aquatic insect community in the downstream study area was dominated by sensitive and facultative genera as opposed to pollution tolerant forms (Mass. Division of Water Pollution Control, 1975b). This indicates a reasonably healthy aquatic system. However, samples downstream of the study area reflected a more stressed environment with higher nutrient levels and lower dissolved oxygen levels.

The fish community in the downstream study area is also shown in Table 1 of Appendix B. This community was more diverse than the upstream community and is dominated by largemouth bass, chain pickerel, pumpkinseed and creek chubsucker. The remaining species included red-breasted sunfish, golden shiner, bluegill, yellow perch, eel, yellow and brown bullheads, and white sucker. Their numbers and biomass are also exhibited in Table 1 (Appendix B). Legal-sized bass made up about 20% of the total catch of this species. Young-of-the-year for most species were present which suggests that natural reproduction was generally successful adding recruits to the generally healthy populations.

The upstream and downstream fishery habitats were also evaluated using the Habitat Evaluation Procedures HEP (FWS, 1980). Choice of the evaluation species by representatives of the Corps, U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife was generally restricted to species of interest and for which models were available that applied to the French River System. Four species fit these requirements: Largemouth Bass, bluegill (as representive of the sunfishes in general), white sucker, and black bullhead as a surrogate for brown and yellow bullhead. The Habitat Suitability Indices (HSI's) and Habitat Units (HU's) for the upstream and downstream study areas are exhibited in Table IV-3. A discussion of the sampling methodologies, assumptions and generation of these numbers may be found in Appendix B of this report. Although the HSI values are not totally comparable to the observed populations due to the limited nature of the field sampling of the upstream and downstream communities, certain observations can be made. The larger amount of food and cover in the downstream habitat can probably account for the better populations of bass and sunfish noted there. The reverse is true for bullhead - the upstream habitat provided better food and cover than the downstream habitats. It is not clear why the HSI does not reflect the larger population of white sucker in the upstream study area.

8. Endangered Species

The U.S. Fish and Wildlife Service has indicated that the Hodges Village Reservoir area does not provide critical habitat for any Federally listed threatened or endangered species. Although not recorded in recent times, the reservoir area does have the potential as a stopover point for a migrating bald eagle or peregrine falcon. Osprey, although not on the Federal list is considered a species of concern, and occasionally use the area. Better habitat for these species is offered elsewhere in central Massachusetts which offer more likely resting and feeding areas.

The quaking bogs and the cedar swamp (Figure IV-4) do support the unusual insectivorous plants, sundew and pitcher plant, respectively. However, neither of the habitats are expected to be affected by the project.

TABLE IV-3
BASELINE HABITAT SUITABILITY INDICES (HSI's) AND HABITAT UNITS (HU's)
OF THE FISH SPECIES FOR THE UPSTREAM
AND DOWNSTREAM RIVERINE HABITATS

Evaluation Species	Upstream Mean HSI (Habitat Unit/Acre)	Upstream HU	Downstream Mean HSI (Habitat Unit/Acre)	Downstream HU
Largemouth bass	0.83	9.1	0.89	15.1
Bluegill	0.82	9.0	0.84	14.3
White sucker	0.81	8.9	0.81	13.8
Bullhead	0.87	9.6	0.84	14.3

B. Recreational Resources

The Hodges Village Dam project area is utilized by the general public for fishing, hunting, picnicking, sightseeing, snowmobiling, hiking and horseback riding (see Table IV-4). The Massachusetts Division of Fisheries and Wildlife leases 676 acres, the majority of the reservoir area, for wildlife management. Two additional areas totaling 109 acres, the Greenbriar and Rocky Hill Recreation Areas (see Figure I-2), are leased to the town of Oxford for recreation purposes. The only recreation facility at Rocky Hill is a Little League baseball field which is used primarily during the Little League season. The Greenbriar Area consists of a baseball field, tennis courts, and a restroom building. A network of snowmobile trails through the project area was established and is maintained by the Oxford Snowdusters Snowmobile Club.

The Massachusetts Division of Fisheries and Wildlife stocks the reservoir area annually with about 70 pheasants. Native raccoon, cottontail rabbit, grouse and quail also are available for local hunters. As Table IV-4 shows, hunting, fishing and trapping activity in the project area has declined over the last several years.

C. Aesthetics

Hodges Village Dam is situated in a region of rolling hills with an elevation range of approximately 200 feet. Most of the landscape is covered with mixed hardwood-softwood forests with the exception of scattered residential and commercial development along major roads and extensive development in the town center adjacent to the east side of the project area. The project area is also bordered on the east and west by large sand and gravel borrow pit operations.

Hodges Village Dam is characterized as a dry bed reservoir, and as such, normally has no lake except during flood water storage periods. The reservoir area is generally a wide flat basin divided by the narrow meandering channel of the French River. The lower one-third of the reservoir is an open wet meadow surrounded by red maple swamp, forested upland, and the rock faced earth fill structure of the dam (Figure IV-5). A service road on top of the dam and a small stretch of Old Howarth Road on the west side of the dam provide the primary public overlooks of this area (Figure IV-6 and IV-7).

The remainder of the impoundment area is generally wooded swamp of varying density which limits long views of the project area. The only significant vantage point in this portion of the reservoir area is the elevated roadway of Massachusetts Route 12 which provides an open view of the Greenbriar Recreation Area.

Flood storage has normally occurred during late winter and early spring, minimizing damage to vegetation in the reservoir area. During the growing season the reservoir is well vegetated with herbaceous and woody

TABLE IV-4
HODGES VILLAGE PROJECT VISITATION DATA[1]

Year	Sight Seeing	Ball Playing	Hiking	Snow Mobile	Motor Cycle	Boating	Hunting	Fishing	Trapping	Other	Total
1976	29,059	21,376	3,750	5,524	9,667	442	8,362	3,103	70	34,108	100,212
1977	44,412	20,843	1,976	5,373	5,562	912	14,046	3,987	96	34,575	102,219
1978	42,288	20,398	706	9,116	1,122	448	10,015	1,345	64	45,014	101,428
1979	40,625	31,475	672	46	1,218	561	10,014	1,948	88	25,126	109,907
1980	45,726	32,466	1,126	48	1,659	396	7,965	1,483	60	47,452	122,764
1981	41,085	28,324	749	36	1,160	303	7,057	798	30	36,918	116,525
1982	42,997	29,587	992	685	891	389	7,013	1,150	2	39,220	122,737
1983	37,939	22,275	618	356	545	430	7,685	662	0	36,042	106,522

1 Visitation measured on basis of primary activity for each visit only

native wetland plant species. Reservoir operations do, however, have an impact on the native vegetation. During winter water level fluctuations in the reservoir, ice movement strips lower branches from large trees and crushes some small trees. The result is a noticeable thinning of the understory vegetation layer between the tree canopy and the shrub layer. Water level fluctuation also results in the accumulation of woody debris around the perimeter of the reservoir. Also, a recent late spring flood storage event, in combination with high winds, caused extensive uprooting of red maples in the reservoir. Damage caused to the red maple swamp south of the Greenbriar Recreation Area is particularly visible to the public.

Another significant visual feature in the reservoir is an abandoned railroad right of way which traverses the west side of the project area north and south. This right of way is now used in part as a haul road for the gravel pit operator on the west side of the reservoir and has been widened for this purpose. The right of way also provides vehicular access into the lower portion of the reservoir. From this right of way the extensive vegetated wetland of the lower reservoir is readily visable.

D. Historical/Archaelogical Resources

The diverse environment of the French River Basin would have been attractive to prehistoric peoples as a source of fish, game, and wild plant foods, and includes extensive areas suitable for the small-scale agriculture practiced later in the period. Sites within the basin appear to date from as early as 10,000 - 8,000 B.C., but none are reported within government lands at Hodges Village Dam. A reconnaissance survey of the lands which would be affected by low flow augmentation, undertaken in September 1983, found no prehistoric resources.

The first European settlement of Oxford was by Huguenots, in 1686, but was twice abandoned due to Indian raids. The first permanent settlement of the town was by New Englanders in 1713. The town's economic base was primarily agricultural until arrival of the textile industry in 1812. Industrial development continued throughout the 19th century; declining in the 20th. The town today has a mixed economic base, with much land still under agriculture.

The first saw and grist mill at Hodges Village, south of the project area, was built sometime between 1722 and 1732. Woolen manufacture took place at this location from 1822 to 1920's. This mill used water stored at about the location of the summer pool of Hodges Village Dam. Scattered farms existed within present government property limits during the 19th century, but the only historic period features within the lands which would be affected by low flow augmentation are the road system (pre 1831) including ruined bridge piers, Boston & Albany railbed (pre 1898) and some early 20th century refuse scatters.

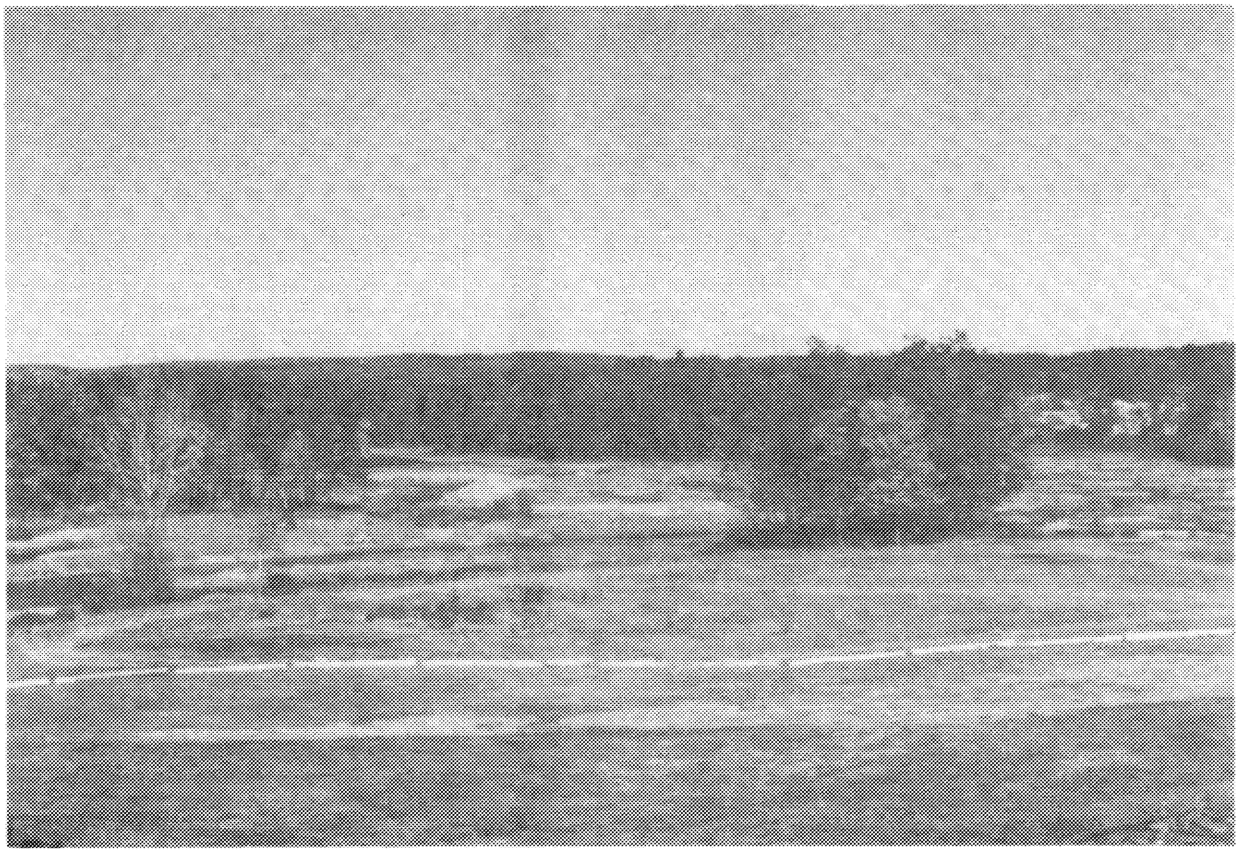


FIGURE IV-5. Hodges Village Reservoir at normal water level without flood storage (Elevation 468 feet NGVD) as viewed from the midpoint of the dam service road.

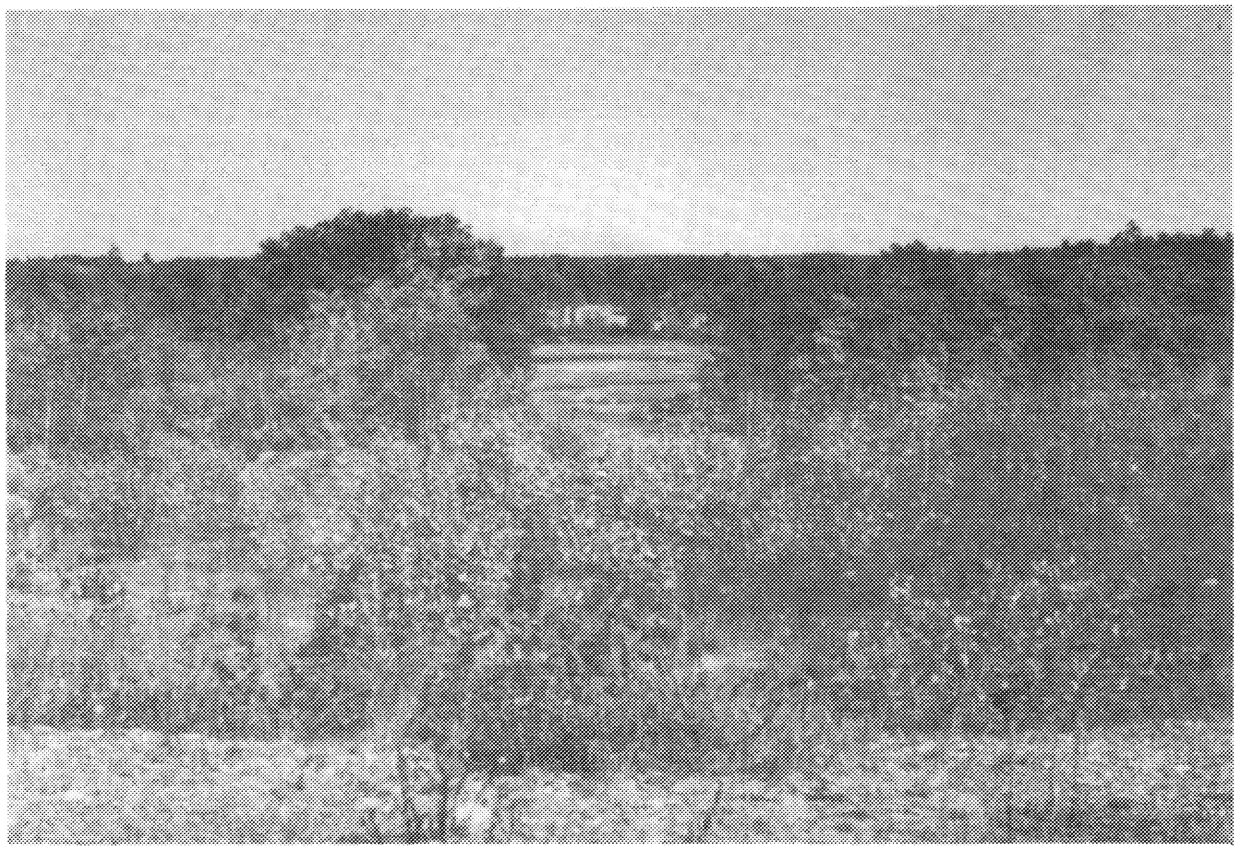


FIGURE IV-6. Hodges Village Reservoir at normal summer water level, as viewed from the old overlook area on Old Howarth Road.

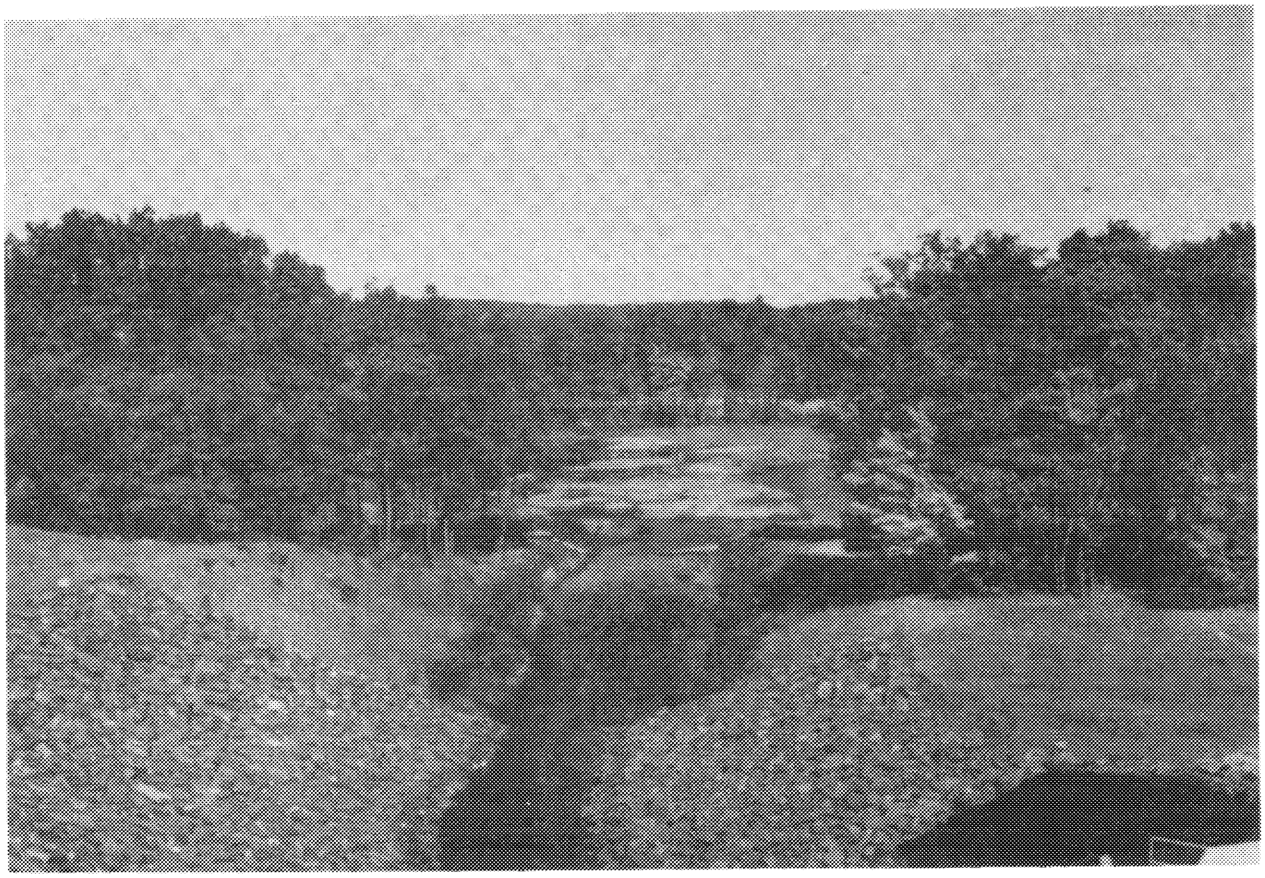


FIGURE IV-7. Inlet channel to Hodges Village Dam, at normal summer water level without flood storage (elevation 468 feet NGVD), as viewed from the west end of the dam near the gate house.

E. Socioeconomic Resources

1. Population and Housing

Historical population data from the annual town reports indicate a relatively stable population in Oxford following the industrial period of the 1800's. At the turn of the century, Oxford had approximately 3000 residents.

All decades since the turn of the century showed population increases although the slowest period of growth was between 1920 and 1930. Oxford, like many northern towns, suffered population losses in the 1920's due in part to a statewide trend that saw much of the Massachusetts manufacturing industry head to the south for cheaper labor and less expensive raw materials.

The post-World War II "boom" produced unprecedented surges; from 1950 to 1960 Oxford's population increased by 58 percent. Veterans were building homes with FHA assistance and economic prosperity seemed to follow the routes of new and improved highways into suburban and rural areas which had not previously been tapped as sites for new homes and businesses. Since 1960, Oxford's population has continued to grow, however, the rate of growth is a drastic reduction from the 1950 to 1960 period. Table IV-5 shows the population changes that Oxford has undergone between 1900 and 1980.

Housing units in Oxford in 1980 totalled 3,948. This is a 35.9 increase from the 1970 total of 2,905 units. Of the 1980 total, 71 percent were single family units; 21 percent of the residential structures contained 2 to 9 units. A total of 275 structures had 10 or more units.

Apartment construction made a significant contribution to the housing increases during the 1970's. The most recent large developments have been Thayer Village, north of Route 20, of 168 dwelling units and the low income Orchard Hill development of 220 units. However, single family units still predominate. Sherwood Forest located on Sunset Avenue extension is the most recent large single-family development of 156 units.

2. Economy

In its first hundred years, Oxford's chief industry was agriculture. By the early 1800's, a tannery had been constructed and saw mills had been built. Over the next one hundred years Oxford became industrialized from the sale of manufactured products produced in newly built shops and mills. The small industries in Oxford produced cotton and woolen goods, shoes, harnesses, cotton thread, friction matches, pistols and rifles.

TABLE IV-5

Population, 1900 - 1980

Oxford, MA

Year	Population	Change	% Change
1900	2,677		
1910	3,361	684	25.6
1920	3,820	459	13.7
1930	3,943	123	3.2
1940	4,623	680	17.2
1950	5,851	1,228	26.6
1960	9,282	3,431	58.6
1970	10,345	1,063	11.5
1980	11,680	1,335	12.9

Today, Oxford's economy is still dependent on manufacturing. The decline of the textile industry in New England changed Oxford from an industrially independent town to a town dependent on a major urban core, i.e., Worcester.

Data for 1980 indicates that 31 percent of employed persons in Oxford are employed in the government sector. Employment in this sector is closely followed by employment in the manufacturing sector which accounts for 30 percent of job offerings. The wholesale and retail trade sector and the services sector follow manufacturing. Table IV-6 shows the employment by industrial sector in Oxford for both 1980 and 1970.

Employment in manufacturing has increased significantly, growing 78.2 percent between 1970 and 1980. Services showed significant growth over this period of 33.6 percent, increasing its proportion of the total employed from 20.6 to 21.6 percent. Wholesale and retail trade, showing a 13.8 percent decrease in number employed, dropped in its proportion of total employment from 29.1 percent to 19.7 percent.

Oxford lies within the Worcester Standard Metropolitan Statistical Area (SMSA) and by definition then is "socially and economically integrated with the central city, Worcester." It is estimated that most residents in the community work in Worcester. Most of the people employed in Oxford, however, live in Oxford.

The unemployment rate for Oxford during July 1983 was 9.2 percent. The labor force totaled 6,148 with 568 unemployed. Unemployment was worse in Oxford than the 6.9 percent rate reported for the Worcester Labor Market Area (LMA)*, whose rate was worse than the state's rate of 6.2 percent. Labor force data is presented in Table IV-7.

3. Land Use

A look at both 1965 and 1975 land use data for Oxford provides some insight into recent development trends. Basically, acreage for every category increased, with the exception of vacant land, which provided all the land that saw new development.

The largest percentage increases occurred in the commercial and industrial land use categories which experienced increases of 36.5 percent and 34.5 percent, respectively. The largest absolute increase occurred in the residential category which grew by over 200 acres between 1965 and 1975. This category has continued to see large tracts of land developed as indicated in the housing section.

Land use data for 1965 and 1975 is presented in Table IV-8. The area surrounding the Hodges Village Dam is basically undeveloped, and since the

*The LMA includes all the communities in the SMSA and Douglas and Rutland.

TABLE IV-6
Employment by Industry
Oxford, MA

Industry	1980[1] Number Employed	1980[1] Percent of Total	1970 Number Employed	1970 Percent Total
Agriculture, Fisheries Forestry	C [1]	NA	11	1.5
Mining	C	NA	0	0.0
Construction	71	7.7	105	14.5
Manufacturing	408	44.3	229	31.7
Trans., Comm. & Util.	14	1.5	12	1.7
Wholesale & Retail Trade	181	19.7	210	29.1
Finance, Ins. & Real Estate	30	3.3	6	0.8
Services	199	21.6	149	20.6
TOTAL	921 [2]	100	722	100

(1) C Indicates confidentiality of data reported when there were fewer than 3 reporting units in a sector.
(2) Employment in the government sector has been omitted here to allow for comparison of 1980 data and 1970 data which did not include government employment.

TABLE IV-7

Labor Force Statistics
July 1983

	Labor Force	Employed	Unemployed	Unemployment Rate
Oxford	6,148	5,580	568	9.2
Worcester LMA	199,691	185,830	13,861	6.9
Massachusetts	3,046,300	2,856,400	189,900	6.2

Source: Massachusetts Division of Employment Security

TABLE IV-8

Land Use, 1965-1975

Oxford, MA

Uses	1965 Acres	1975 Acres	Percent Change
Agriculture	266.12	296.37	11.4
Open Space	782.22	853.75	9.2
Recreation	93.97	111.50	18.7
Residential	879.26	1,085.43	23.4
Single Family	783.13	971.28	24.0
Two & Three Family	89.05	93.84	5.4
Multi Family	7.08	20.31	186.9
Industrial	267.90	360.39	34.5
Commercial	61.00	83.26	36.5
Institutional	665.11	808.16	21.5
Water	507.85	513.03	1.0
Total Use	3,523.43	4,111.89	16.7
Vacant	14,006.17	13,417.71	-4.2
Total Land	17,529.60	17,529.60	0.0

construction of the dam has been utilized for recreational purposes. Because of flood control operations, development of the immediate area surrounding the dam site is prohibited. There is potential, however, for recreational usage. Recreational activities are pursued within the Greenbriar and Rocky Hill Recreation Areas which combine for a total of 109 acres leased from the Corps by the town of Oxford.

The entire area owned by the Corps totals 871 acres. Of this fee owned area, two recreation areas totaling 109 acres are leased to the town of Oxford, 676 acres are licensed to the Massachusetts Division of Fisheries and Wildlife, and the remaining 86 acres are reserved for project operation and maintenance. Sixty-five percent of the area is forested, 20 percent is wetland, and 15 percent is fields and meadows.

Oxford's Planning Board has identified a number of specific needs for additional recreational facilities and programs. The board has suggested the formation of several recreation programs, including a swimming program, a tennis program, a snowmobile program, and a skating program. The board also suggested that the town look into the establishment of a recreation center in Oxford.

The master plan prepared by the Corps CE, 1980) recommends recreational development for the Hodges Village Reservoir area which is compatible with several of Oxford's expressed needs. Facilities proposed for the Greenbriar Recreation Area include a soccer field, playground, tennis courts, basketball courts and a softball field. Because of supervision and management problems, no new facilities have been proposed for the Rocky Hill Recreation Area.

The privately owned land adjacent to Hodges Village Reservoir on the west is gradually being developed from woodland to residential use, in addition, to the extensive Scavone Sand and Gravel Company excavation operations. The east side of the reservoir is partially bordered by State Route 12 which passes through the center of Oxford. Private residences, the Oxford High School, the North and St. Roche Cemeteries, the Oxford Water Pumping Station and a town gravel pit are all located between the reservoir and Route 12.

V. IMPACTS OF THE ALTERNATIVES

A. No Action Alternative

As described in Section III of this report the "no action" alternative means that low flow augmentation (LFA) would not be implemented at Hodges Village Reservoir.

1. Future Condition for Natural Resources.

The future conditions of the study area's natural resources were analysed over the project life of 100 years. This serves two purposes: (1) This allows prediction of future conditions for the "no action" alternative and (2) serves as a basis for measuring project impacts and mitigation over the same period of study.

a. Geology/Soils:

Without implementation of LFA no changes in the nature of geological deposits or soils of the reservoir would occur over the 100 year period of study assuming that sand and gravel mining would not expand on the present Corps owned properties. It is anticipated that the soils would accumulate humus naturally over the period of study.

b. Vegetation:

The distribution of the vegetation in the reservoir without LFA would be affected by a number of factors. First, flood control operations would continue to periodically inundate the cover types immediately adjacent to the French River and thus prevent herbaceous and shrub areas from developing tree canopy. This effect is typical of "dry bed" flood storage reservoirs and has been observed at Hodges Village and other similar reservoirs throughout New England Division. Above this zone of flood disturbance, natural succession and land management practices would influence the vegetation patterns. Oak forests are expected to mature while some acreage of upland forb/grassland areas would succeed into shrub and later forest over the project life. Also, a 25 ft. wide cattail stand in the palustrine emergent marsh behind the dam (Figure IV-4) is expected to encircle the marsh perimeter in about 50 years. Another major influence is the forestry management plan (CE, 1981). It has been projected that the proposed selective cutting program in the upland pine and oak forests would result in an net increase in acreage of pine and a decrease in oak over a 50 year period. In additon, about 5 acres of small clearcuts would be maintained throughout the project life for wildlife management purposes. Thinning operations would also produce about 3-5 snags per acre on land which would develop as deciduous forest and 1-3 snags per acre on land which develops as conferous forest. (A snag is a dead tree or a dead portion of a tree which is about 6 inches in diameter and provides nesting sites for woodpeckers). For the purposes of this study, recreational land use of the reservoir land and lands outside the impoundment were assumed not to change over the project study period because of difficulty in prediction.

Based on the above considerations, the future acreages of each cover type in the 794 acre study area were projected (Table 8-1, Appendix A). Values for years 0 (baseline), 1, 50 and 100 over the 100 year project life were included to indicate when significant changes would occur. Three cover types are predicted to change over the study period: upland forb/grassland and upland deciduous and coniferous forests. Upland forb/grassland was projected to increase by 5 acres because of new clearcuts for wildlife management as well as maintenance of existing area. Because of top soil removal of some areas, succession to other cover types was assumed to proceed slowly. Thus, there was an assumed reduction of 6 acres at years 50 and 100. Forestry management would also reduce the acreages of oak from its present 384 acres to 195 by year 100. Pine, on the other hand, would increase from 77 to 273 acres by year 100. Shrubland gains by succession from grasslands was assumed to be equal to the losses from succession to forest cover types. No changes in the other cover type acreages were projected. The changes in each cover type are described in more detail in Section 8 of Appendix A.

c. Wildlife:

The above described changes in the quantity and quality of the vegetation cover have different consequences for the wildlife that use these cover types. The changes, either positive or negative, can be reflected in the difference between the baseline Habitat Units (HU's) which are a function of the quantity or quality of the cover type for a species (HSI x Acreage = HU), and the average annual HU's (or AAHU's) which reflect the qualitative and quantitative changes to the cover types for the evaluation species over the project life. Thus, an increase in quality and/or quantity of habitat for a given species would be reflected in an increase in AAHU's for over the baseline values. Conversely, the reduction in AHHU compared with baseline HU's reflects negative changes in habitat suitability or acreage for a given species. If no quantitative or qualitative changes occur that could enhance or limit the population, the HU's and AAHU's should remain the same. Table V-1 exhibits the baseline HU's and AAHU's for each evaluation species. The calculation of the AAHU's were carried out by Sanford Ecological Services (SES) according to ESM 102 (FWS, 1980) and is exhibited in Tables C-1 through C-15 (Appendix A). Table V-1 indicates that, except for red-backed vole, wood frog and downy woodpecker, there is little or no change in the quality and quantity of habitat of the evaluation species. The decrease in habitat for these species would be the result of forestry management practices. The reduction in acreage of upland deciduous forest was responsible for the loss of red-backed vole habitat (Table C-1). The limiting factor for wood frog would be its exclusive use of upland and wetland deciduous forests. As shown in Table V-1, the upland deciduous forest acreage would be significantly reduced over the project study period. The shift in dominant

TABLE V-1
BASELINE AND AVERAGE ANNUAL HABITAT UNITS OF THE WILDLIFE SPECIES
WITHOUT THE PROPOSED PROJECT
AT HODGES VILLAGE RESERVOIR

Evaluation Species	Baseline Habitat Units at Target Year 0	Average Annual Habitat Units over 100 Year Project Life
Red-backed vole	160	123
Mink	389	389
Muskrat	20	22
Dusty salamander	106	114
Wood frog	373	257
Snapping turtle	34	34
Green heron	128	128
Black duck	60	60
Wood duck	88	91
Broad-winged hawk	653	653
American woodcock	182	179
Belted kingfisher	36	36
Downy woodpecker	418	369
Yellow warbler	40	40
Swamp sparrow	119	119

acreage from oak forest to pine forest is the primary reason for the reduction in habitat for downy woodpecker. The projected forestry management snag density (1-3 snags/acre) would be a limiting factor. Forestry practices also would be responsible for small loss in habitat for red-backed vole, woodcock, and the small gain in habitat for dusky salamander. The increase in the cattail stand in the palustrine marsh behind the dam was the factor that resulted in a small increase in habitat for muskrat and wood duck. The remaining species did not exhibit a change in habitat units over the project study period.

d. Fisheries:

It was assumed that physical habitat in the upstream and downstream riverine study area would remain essentially unchanged over the project study period without implementation of the proposed project. It is anticipated that several factors would tend to equalize the habitat suitability over the long term for % pool, % cover, dominant substrate water quality, water fluctuations and velocities. As with any stream system the seasonally varying flows may change the general appearance of a river, in terms of sinuosity, erosion and deposition areas, wetted perimeter etc. over the long term. One would anticipate the periodic high flows would erode some areas which would be deposited in other areas. Unless the flow regime would be significantly changed over the long term, a significant change of % pools, % cover and substrate would probably not occur. Such a change is not anticipated for the study area. Percent pool and substrate may change in a particular reach, but would be established in another reach because the long term flow regime would not change. Percent cover, in terms of rocks, logs, debris, and aquatic vegetation would be gained in areas of sedimentation and accumulation and eroded out of high energy areas. Streamside vegetation may be undermined on the erosion side of a meander but develop on its deposition side. Thus, the overall effect is no change unless the flow regime is changed by alteration of flood control operations or removal of the dam. The latter are not anticipated. Water quality is expected to improve over the long term because of the improvement of the Leicester Sewage Treatment Plant. This would probably reduce the nutrient loading downstream of the plant in the study areas. This would probably have the effect of reducing the algae growth on the aquatic rooted vegetation and substrate in the river and probably reduce the biological oxygen demanding substances. Thus, the dissolved oxygen would probably not fall below 6 mg/l as it occasionally does now under current conditions.

These considerations would not change the habitat suitability of the fish species in the French River. The conditions for the expected water quality improvements did not vary outside the range of the parameters used in the species models. Thus, the average annual habitat units would be the same values as the Habitat Units exhibited in Table IV for the upstream and downstream study areas. The calculation of the average annual habitat units is exhibited in Tables 10 and 11 of Appendix B for the upstream and downstream study areas, respectively.

2. Future Conditions for Recreational Resources

Future recreation development at Hodges Village Dam is planned to be concentrated at the Greenbriar Recreation Area. Proposed future facilities as outlined in the project Master Plan for Recreation Resources Development include an additional baseball field, a soccer field, additional parking, additional multi-use play courts, playground facilities, and access road relocation to improve vehicle circulation. Development of any additional facilities is contingent upon a cost sharing agreement with the town of Oxford or other public body.

The Rocky Hill Recreation Area suffers from continued vandalism due to its isolated location. This facility will most likely be phased out in favor of additional facility development at the Greenbriar Area.

3. Aesthetics

Without the proposed project periodic inundation and ice movement will continue to discourage growth of woody vegetation beyond the shrub layer and gradually eliminate the canopy of large trees from the lower portion of the reservoir. The result will be a gradual change to shrub meadow vegetation in the lower half of the reservoir. At the former project overlook on Old Howarth Road, natural vegetation growth will gradually block the view of the reservoir area.

4. Future Conditions for Historical Archaelogical Resources.

There would be no impacts to Historical/Archaelogical Resources in the reservoir area other than those experienced due to ongoing flood control operations.

5. Future conditions for Socioeconomic Resources.

a. Future Population

Population projections prepared by the Central Massachusetts Regional Planning Commission indicate Oxford's population at 12,925 by the year 2000. Projections for five year increments to 2000 are presented below:

1985	12,100
1990	12,350
1995	12,725
2000	12,925

This projected growth to the year 2000 is a 10.7 percent increase from the 1980 population of 11,680.

b. *Future Growth*

The town of Oxford has been making efforts to strengthen its economic base. It has adopted two strategies for accomplishing this: one is attracting new industry and jobs; and the other is encouraging local employers to expand. With the completion of Route 52, the prospect for industrial growth should be quite favorable.

Oxford has increasingly become a bedroom suburb of Worcester and is expected to continue growing in such a manner. Very little commercial growth can be foreseen in the future. Any commercial growth that is likely to occur would probably take place along Route 20 or south of Oxford center along or just off Route 12.

B. Impacts with Implementation of Low Flow Augmentation without Mititgation

1. Impacts to Natural Resources

The discussion below is based on the proposed project as described in the project description (Section I of this report). This discussion assumes that the proposed wildlife mitigation measures would not be implemented. These will be addressed in the following section (Section C).

a. Geology/Soils:

As discussed in the project description, approximately 265,000 cubic yards (cy) of organic and surficial sediments would be removed within the 120 acre area of the reservoir (Figure I-2). On the average, this volume translates to the removal of soil to an average depth of 1.5 feet over the 120 acre area. Removal of the riverbed and adjacent glacio-alluvial deposits would change the surface sediment quality of that portion of the reservoir area. Recent test pits dug by Corps personnel indicate that the resulting surface sediments would probably consist of 2/3 gravel-sized particles and 1/3 sand-sized particles, by weight. This essentially would comprise the bottom of the proposed permanent and augmentation pool. The permanent pool and augmentation pool areas on the west side of the abandoned railroad tracks, however, would not be stripped and would retain its present organic soils.

b. Vegetation:

(1) Impacts of Project Implementation.

As mentioned in the project description (Section I) all the vegetation within the 180 acre impact area would be cleared and grubbed up to elevation 477.5 feet, NGVD to maintain high water quality and avoid treekill around the perimeter and resulting maintenance problems. The areal extent of the impact area is composed of (1) the 120 acre stripped area discussed above, which includes 103 acres of permanent pool and 17 additional acres of seasonal augmentation pool; (2) 60 acres of cleared-but-not-stripped areas which include 6 acres of permanent pool, 29 acres of augmentation pool and 25 acres of the so-called "freeboard area" 2 vertical feet above the augmentation pool (between elevations 475.6 and 477.5 ft, NGVD) (Figure I-2). As discussed above, organic soils were allowed to remain in the cleared pool areas west of the abandoned railroad bed because it was determined not to be significant to degradation of the augmentation water quality.

Table 9.1 of Appendix A indicates the baseline reservoir cover type acreage and future changes due to the project. Six target years were chosen to earmark the anticipated various cover type changes over the 100 year economic life of the project. Target Year "0" represents baseline conditions. Target Year "1" was chosen to delineate the result of clearing and stripping operations during project construction. Target Years "10" and "35" indicated major ecological successional changes. Finally Target Years 50 and 100 represent changes due to the forestry management plan as exhibited in Table 8.1 in addition to further succession changes.

The impact area consists of 166 acres of vegetated cover types, 11 acres of river and 3 acres of disturbed areas (gravel pits, roads etc). Comparison of Target Year "1" in Tables 8.1 and 9.1 reveals the composition of the lost 166 acres of cleared vegetation. These are shown in Table V-2. Approximately 65% of the lost habitat would be made up of red maple forest and shrub wetlands. Upland mixed oak was 12% followed by marsh (7%), sedge marsh (6%), upland pine (5%), bog (5%) and upland shrub (2%). A description of each cover type may be found in Section 5.0 of Appendix A.

By the end of the construction period, the cleared and/or stripped cover types including the river and disturbed areas would be replaced by the proposed permanent and augmentation pools and the freeboard areas. The 120 acres stripped permanent and augmentation pools were assumed not to develop vegetation because of the resulting inorganic substrates. However, submergent aquatic vegetation would probably develop in about 25% of the littoral area of the permanent pool by year 100. It was predicted that the 60 acres of cleared-but-not-stripped area would naturally develop into 3 cover types. By Target Year 10 the twenty-five acres of cleared freeboard would have developed into shrub land: 22 acres of upland shrubland in the dryer areas and 3 acres of palustrine shrubland in wetter low-lying areas. The 35 acres of cleared wetland area on the west side of the railroad bed were predicted to develop into a palustrine emergent marsh by Target Year 35. The existing shrub and forested wetland in this area would be cleared allowing herbaceous wetland plants, primarily cattail whose rhizomes already occur in the sediments, to dominate the cover type. The continuous inundation of this area would inhibit succession to shrub and forest wetlands in later target years. Thus, with the gain in 60 acres by year 35, the net loss of wetland and upland habitat would be reduced to 106 acres (166-60) and remain so during the remainder of the

TABLE V-2
AREA AND PERCENTAGE OF IMPACTED VEGETATED COVER TYPES
AT HODGES VILLAGE RESERVOIR DUE TO PROJECT CONSTRUCTION

Cover Type	Area of Cover Type Impacted during Construction (acres)	% Total Impacted Vegetation
Palustrine broad-leaved deciduous forest	58	35
Palustrine needle-leaved evergreen forest	0	-
Palustrine scrub/shrub - bog	9	5
- non bog	42	25
Palustrine emergent marsh	11	7
Palustrine emergent marsh (sedge dominated)	10	6
Upland broad-leaved deciduous forest	20	12
Upland evergreen forest	8	5
Upland scrub/shrub	3	2
Upland forb/grassland	5	3
Total Impacted Vegetation	166	100

project life. Cover types such as upland forb/grassland, mixed oak and pine forest also varied through the project study period. (Table 9.1, Appendix A). These acreages, although affected by the initial loss through clearing at Target Year "1" did not differ markedly from the "without project" acreages predicted in Table 8.1. The reason for this is that the losses and gains of these cover type acreages were primarily affected by non-project associated factors: (1) forestry management practices which were assumed not to change in the area outside the impact zone, and (2) succession of forb/grassland to shrub and forest cover types. The remaining cover type, acreages of sedge marsh, bog, red maple swamp and cedar swamp, did not vary after Target Year 1.

(2) Impacts of Flood Control Operations on Vegetation with Proposed Pools.

In addition to removal during project construction, the reservoir vegetation would be subjected to impacts from flood control operations throughout the project life. The impacts of past operations on the existing project have been addressed in the Environmental Assessment of the Operation and Maintenance of Hodges Village Dam (CE, 1976). Flood control activities have resulted in the vegetation pattern briefly described in Section IV of this report. The zonation was a result of higher frequency and longer duration of inundation during flood storage activities especially in the growing season. The varying flood tolerances of the many species leads to a zonation of more tolerant species dominating the more frequently flooded areas. Also, the lack of woody vegetation, especially trees, is indicative of areas subjected to frequent inundation during the growing season.

Flood control regulations with the proposed project would be operated over and above the permanent pool during the non-growing season and the augmentation pool during the growing season. The vegetated reservoir area most frequently inundated during the growing season would be the freeboard just above the augmentation pool which occurs between elevations of 475.6 and 477.5 ft, NGVD. To minimize future maintenance problems resulting from frequently inundated intolerant vegetation, this area would be cleared of all woody vegetation. It is anticipated that flood tolerant shrubs would probably develop in the area consistent with the new pattern of inundation in about a 35 year period. The low-lying areas of the freeboard would probably develop wetland shrubs such as buttonbush, alder, willow, *Spirea* sp. etc. whereas drier areas would probably be revegetated by upland shrubs. Clearing of the unusual Atlantic white cedar swamp, which is located within the freeboard area (476.5 - 477.5 ft, NGVD), was not considered necessary because the projected frequency and duration of inundation of the upper foot of freeboard during the growing season would be relatively low. Analysis of the storage records for the period 1973 - 1982 revealed that the storages in this upper foot with the full augmentation pool would probably, on the average, only occur once in a ten year period during the growing season (May-October). It occurred for a period of 16 days during the storage of the major summer flood of June 1982. Storage in the lower foot (476.5 ft, NGVD) was projected to occur during 5 of the 10 years of analysis. Except for the June 1982 storage which was projected to last 20 days above the 476.5 elevation, most storages would probably last 5 days or less. The stand is expected to tolerate such storage events.

The augmentation pool at the maximum elevation would be primarily operated between elevations 475.5 and 476.0 ft, NGVD within the lower 0.5 foot of freeboard zone. The target pool elevation during drawdown would be operated on the basis of a program dictated by the rule curve exhibited in Figure I-1. Runoff from small "nuisance" storms during the late spring would likely be stored in the freeboard area when the augmentation pool is at its maximum stage. The pool would be operated to minimize storage in the upper freeboard zone and, hence, reduce the potential for impact to the cedar swamp.

When significant flood storage is anticipated, the gates would be manually operated. During these times, storage above the freeboard area would be likely to occur. However, the frequency of significant storages during the non-growing season is higher than during the growing season when the most harm to trees could occur. Based on the storage records of 1973 through 1982 the total duration of flood storage above the freeboard elevation with the proposed pools would range from 0-30 (average 7) days during the non-growing season compared with 0-16 days (average 2) during the growing season. This low frequency during the growing season would probably not have impacts significantly different than experienced with past flood control operations. A near worst case scenario can be exemplified by projection of the 20 ft storage held at Hodges Village during June of 1982, on top of the maximum augmentation expected to occur at that time. The "dead storage" provided by the augmentation pool would raise the total flood storage by less than two vertical feet from the 20 ft to the 22 ft stage. Based on past hydrographs this "extra" storage would drain off within several days. This, of course, would be dependent upon hydrological conditions and the potential for flooding downstream of the dam which affects the release rate. The low chance of occurance combined with the small difference in storage with and without the proposed project would tend to diminish the significance of this inundation to the vegetation surrounding the pools.

c. Wildlife

Constuction and operation of the proposed project would impact the wildlife that use the project area. Construction activities such as clearing, stripping, and movement of heavy machinery would disrupt and destroy the habitat within the 180 acre impact area as well as disrupt the surrounding area. Increased noise and dust would also affect wildlife activities in the surrounding area. The latter impact would be short term and cease when construction activities are completed. Clearing, stripping, and earth moving activities would be generally accomplished during the driest seasons of the year - summer and early fall. Mobile species would probably escape to less disturbed areas if accessable whereas less mobile forms and especially newly-hatched or born young would likely perish. The surrounding areas would not be able to absorb moving wildlife because these areas are generally already operating at maximum carrying capacities. Wetland associated species would be the most affected while upland species would only be marginally impacted.

The level of impact to wildlife is roughly proportional to the acreage of impacted habitat or cover type. These are listed in Table V-2 of this section. The wildlife species that use these cover types are listed in Tables A-1 through A-18 of Appendix A. The Habitat Evaluation Procedures (HEP) study performed on this project focused on 15 evaluation species which utilize a good cross section of the available impacted reproduction and feeding habitat of the species listed in Tables A-1 through A-18. A guild analysis that was performed on the species (Section II of Appendix A) indicate that most major locations in each cover type were used by one or more of the 15 evaluation species. Thus, the measurement of the loss of quantity and quality of their habitat may be indicative of the habitat loss for the other species. Such was the intention of the HEP study here. Table V-3 indicates the changes in Average Annual Habitat Units (AAHU's) calculated with and without the project. The AAHUs were calculated with the assumed changes in habitat quality and quantity described above and in Section 9 of Appendix A. Future acreages and HSI's were calculated for each Target Year of physical change in the environment (0, 1, 10, 35, 50 100). The HU's were calculated for each species and target year and annualized over the project life (Tables D-1 through D-15 and Table 11.1 of Appendix A). The resulting AAHU's were compared with the similar calculated values assumed for the future conditions without the project. These values and their differences are exhibited in Table V-3 for each evaluation species. Broad-winged hawk and mink exhibited the greatest losses in HU's. The net loss of 121 AAHU's for broad-winged hawk was primarily a result of the loss of red maple and shrub swamp in the impact area. Mink lost the next highest amount of habitat because of the amount of lost wetlands. Even with an increase in the habitat suitability of the proposed pools and the development of the emergent marshes on the west side of the railroad bed, the lost acreage contributed to the net loss of 99 AAHU's. The relatively large taking of red maple and/or shrub swamp also largely contributed to the reduction of habitat for red-backed vole, dusky salamander, wood frog, black duck, wood duck, downy woodpecker, yellow warbler and swamp sparrow. Black and wood duck were able to gain HU's through development of the emergent marsh on the west side of the railroad bed; however, both species still had a net loss of AAHU's. Similarly, both swamp sparrow and yellow warbler gained HU's from the predicted increase in palustrine and upland shrub land in the freeboard area, but still showed a net decline in AAHU's. Species generally associated with the river and emergent marshes, muskrat, snapping turtle, green heron, and belted kingfisher, also lost HU's because of the loss of these habitats. The gains in emergent marsh did not offset the losses except in two species - snapping turtle and belted kingfisher. Both species gained HU's by being able to utilize the permanent and augmentation pools. Mink, black duck and wood duck also

TABLE V-3
AVERAGE ANNUAL HABITAT UNITS (AAHU's) FOR
THE WILDLIFE SPECIES IN THE HODGES VILLAGE STUDY AREA WITH
AND WITHOUT THE PROPOSED PROJECT

Evaluation Species	AAHU's Without Project	AAHU's With Project	Net Change
Red-backed vole	123	74	-49
Mink	391	292	-99
Muskrat	22	16	-6
Dusky salamander	114	42	-72
Wood frog	257	191	-66
Snapping turtle	34	39	+5
Green heron	128	57	-71
Black duck	60	22	-38
Wood duck	91	48	-43
Broad-winged hawk	653	532	-121
American woodcock	179	145	-34
Belted kingfisher	36	104	+68
Downy woodpecker	369	297	-72
Yellow warbler	40	23	-17
Swamp sparrow	119	54	-65
Total AAHU's	2616	1936	-680

received gains from the increase in emergent marshes which did not offset the losses because of the larger acreages of other lost cover types (see above). For a more detailed description of the changes for each species the reader is referred to Section 9.3 and Tables D-1 through D-15 of Appendix A.

In total, Table V-3 indicates that, of the 2616 AAHU's determined to occur at the study area without the proposed action, 680 AAHU's would be lost as a result of that action. This represents a net decrease of about 26% of the available wildlife habitat.

d. Fisheries:

As in the Environmental Setting Section of this report, the fisheries habitat upstream and downstream of the project will be treated separately below.

Upstream

As discussed above, the 11 acres of riverine habitat within the 180 acre impact area would be removed with construction of the proposed project. Construction activities would involve clearing and stripping of the riverine vegetation and soils and the streambed substrate. Portions of the river would be diverted to allow work in the "dry" during construction. Diversions would be created using cofferdams consisting of fill from nearby stripped reservoir areas. It is anticipated that the proposed work would intermittently increase suspended solids, and hence, turbidity and nutrients into the water column during the construction period. This would be minimized by (1) performing the work in the dry as much as possible by diverting water away from the work site and (2) appropriate erosion-control measures such as use of construction cloth or hay bales to prevent loss of sediment and soils into the diverted stream. Water quality parameters are expected to return to background levels once construction is completed.

In terms of the habitat analysis performed on the area, the construction activities would remove a total of 37 Habitat Units (HU's) for the four species evaluated. The reader is refered to Section IV and Appendix B for a description of the lost habitat and derivation of the HU's. The area would be replaced with a 103 acre permanent pool during the non-growing season and a 155 acre augmentation pool during the growing season. The permanent pool would be exclusive of the marsh areas west of the railroad bed. The areas were assumed not to provide suitable fish habitat because the restricted access imposed by existing topographic features and the extensive shallows that would be created by seasonal drawdown. It is anticipated, however, that most species would get into the marshes especially during flood or augmentation storage. Species such as chain pickerel and yellow perch would probably use these areas for spawning and nurseries. However, drawdown during the summer to fairly shallow and vegetation-choked pools would limit growth and population levels in these areas. The fish that do remain and survive would probably serve as prey to wading birds, mink, and other vertebrate carnivores that use marsh areas. The permanent pool east of the railroad bed would have a maximum depth of 6.5 ft near the dam whereas the depth of the augmentation pool would be about 10 feet. Based on the test pits dug in the area, the pool would have a non-organic gravel and soil substrate throughout most of the area. The 17 "extra" acres of the augmentation pool would be left dry during the non-growing season (November-May) except during flood storage events. This would essentially not be useful to wildlife during that period. When the augmentation pool is stored during May, the extra 17 acres that would be inundated would provide additional fish habitat. The pool would be lowered for low flow augmentation according to the rule curve (Figure I-1) found in Section I. It was assumed the the bulk of the 155 acre augmentation pool would be available for fish habitat for approximately 1/3 of the year whereas the 103 acre permanent pool would be available in the remainder. The annual acreage of usable habitat was determined by weighting the acreage according to the time it was available. The result was 120 acres of usable habitat. It is anticipated that the pools would have good water quality assuming the upgrading of the upstream Leicester treatment plant is functional. The shallow depth of both pools would limit the stratification during summer. Computer simulation studies indicates average summer temperatures could range from 68-70°F. Maximum temperatures in the shallow wetland area were assumed to reach 84.5°F which has been recorded in the pool behind the dam during August. For the purposes of the HEP study, four Target Years were chosen to denote changes in habitat that the fish would be sensitive to: 0, 1, 5 and 100. Target Year "0" represents the baseline year on the river reach before construction. Target Year "1" would indicate the construction period. Because the above described construction activities would take place during a one year period, the Habitat Suitability Indexes during that time was assumed to be 0. The Target Year "5" was chosen to indicate the quality of Habitat that the weighted pool provides after the aquatic environment and the fish populations have stabilized. Because of the inorganic nature of the gravel/sand bottom, it was assumed that the aquatic vegetation and cover, in general, were nonexistant. Finally, by Target Year 100, the end of the project life, the littoral area of the permanent pool would have about 25% cover with submergent aquatic vegetation and about 5% with debris accumulated from flood control operations. These estimates are conservative and the actual cover could be greater.

Future HSI's were determined for each Target Year for each evaluation species. These are exhibited in Table 20 of Appendix B. As noted above, the HSI's are 0 for Target Year "1", intermediate for Target 5 and highest for Target Year "100", primarily because of the cover afforded to the species in the littoral area of the permanent pool. The littoral area of the augmentation pool would be available for use by the species for spawning for the June and July portions of their spawning period. However, nests which may occur in the very shallow areas of the maximum augmentation pool may be dewatered especially for those still spawning in late July or August when the rate of drawdown would increase. The use of a weighted average of usable pool area compensates for this factor in the resultant HU's. Based on the HSI's of life requisite components in the lower portions of Tables 12, 13, 15 of Appendix B, the food and cover are generally most limiting to the species, especially in Target Year "5". The lack of cover also significantly lowers the suitability for successful bullhead reproduction for year "5" (Table 15).

Based on these considerations Average Annual Habitat Units (AAHU's) were calculated according to ESM 102 (FWS, 1980). The resulting values and comparison to values without the project are shown in Table V-4. The weighted useable pool provides a net increase of 304 AAHU's. Although the habitat suitabilities are generally lower, even by year "100", the large amount of acreage supplied by the reservoir results in a general increase in total habitat. Thus, it is anticipated that the fish populations in the study area would increase proportional to the net increase in AAHU's. All species that occur in the upstream river reach should benefit from the larger amount of available habitat.

Downstream

The impacts of project construction on the downstream fishery habitat would be short term and generally limited to the aquatic environments immediately below the dam. As mentioned above, construction activities in the reservoir would probably elevate suspended solids and, hence, turbidity in the dam outflows. Construction in the "dry" and sediment control measures would tend to minimize this effect. However, storms or resulting flood storage during the construction period would tend to further enhance suspended solids in the outflows. This would impact Auguttenback Pond, which is about 600 feet downstream of the dam's outlet works (Figure IV-3), and the reach of the French River between the dam and the pond. Sedimentation in these areas could smother benthic plants, invertebrates and fish nests in the pond or along the river and thereby reduce the productivity of these habitats. Dissolved oxygen levels are also expected to become depressed which could stress the pond's aquatic organisms during the summer months. It is anticipated that the pond would act as a sedimentation basin which would allow the increased suspended solids to settle out before being passed to the downstream riverine habitat. This would probably occur intermittently for the duration of the construction period (spring through fall). Suspended solid and dissolved oxygen levels would return to preconstruction levels after construction is completed. Auguttenback Pond may require dredging of the accumulated sediments at that time. The pond would be monitored to determine the extent of sedimentation. The dredged sediments can be used in the construction of the mitigation structures discussed below in Section V.C.

Once low flow augmentation is operational, only minor changes in fish habitat in the downstream study area are expected. Significant improvements of the French River's water quality are anticipated with two other measures proposed by the Massachusetts Division of Water Pollution Control and the U.S. Environmental Protection Agency. These measures include: (1) sewage treatment plant improvements in Webster and Dudley and (2) deactivation of six impoundments in the lower French River basin (letter, 18 May 1983, Section VI). The positive impacts of the combined improvements will be evaluated in the forthcoming Environmental Assessment to be published by the agencies mentioned above.

TABLE V-4
AVERAGE ANNUAL HABITAT UNITS (AAHU)
OF FISH SPECIES WITH PROJECT WITHOUT WILDLIFE MITIGATION

Upstream Species	AAHU without project	AAHU with project	Change AAHU
Largemouth bass	9.13	85.76	+76.63
Blue gill	9.02	89.14	+80.12
White sucker	8.91	96.05	+87.14
Bullhead	9.57	70.06	+60.49
TOTAL	36.63	341.01	+304.38
Downstream			
Largemouth bass	15.13	15.13	0
Bluegill	14.28	14.28	0
White sucker	13.77	13.77	0
Bullhead	14.28	14.28	0
TOTAL	57.46	57.46	0

The downstream limit of influence on warm water fish populations of low flow augmentation alone would probably be at the confluence of the French River with Lowes Brook and, hence, the limit of our study area. Below this point the combined inflows of tributary streams, wetland drainages and land runoff would exert more influence than the augmentation flows acting alone. Minor changes in water quality parameters upstream of this point are expected. With the improvement in Leicester sewage treatment plant, the dissolved oxygen levels should be slightly improved. There would be only a small change in the downstream water temperatures which would occur only during the summer. A computer simulation study predicted an increase in average water temperature by about 1.5° F for the period June 15 through September in an average year. Maximum summer temperatures in backwater areas would probably increase by about the same amount. The flows and, hence, velocity regime would also not significantly change. Enhancement of low flows from 3 to a minimum of 10 cfs could increase the average stream velocities by 2-3 cm/sec. Most such velocities had little effect on species. The HEP analysis done on this area assumed that spawning and nursery areas for the bass, sunfish and bullhead would not be limited by such small changes in flow. Velocities would not be expected to change in the protected pools and backwaters that these species are most likely to use for these purposes. Also, a significant change in wetted perimeter would not occur based on the existing channel cross sections within these ranges of flows.

The amount of cover afforded by instream debris and vegetation would not be expected to change. The lower nutrient loading of the downstream because of the upstream improvements may reduce periphyton growth on the aquatic vegetation. However, the vegetation would probably provide an equal amount of cover with a reduction in value to aquatic organisms that use the periphyton for food.

The only anticipated change in flow regime would occur during the May augmentation storage period and would probably be minor in significance. It was determined that the withholding of daily flows of 8 cfs/day for a 30 day period would store enough water to fill the augmentation pool. The mean monthly flows for May for the period of record are about 61 cfs. A reduction of 8 cfs for storage would not significantly impact downstream resources. However, during average flows, storage during a dry May period could have some adverse consequences downstream. Holding back of 8 cfs during a 7 consecutive day 10 year low flow (7Q 10) of 15.5 cfs would reduce the downstream flows in half. To reduce the potential impact, storage would not take place during such a period and could probably be made up on other days of the month when the flows are more than adequate. Review of the records indicates that the mean monthly flows would probably exceed 31 cfs for 9 out of 10 years and 26 cfs for 19 out of 20 years. Thus, on the rare occassion that 15 cfs is imposed on the downstream resources, these flows could be maintained without affecting low flow augmentation storage operations for most years.

The main implication of May low flows for downstream fisheries would involve the lowering the water or dewatering associated coves or backwater areas that may be traditional spawning and nursery habitat. A worst-case scenario may result in the reduction or loss of that years' young-of-the-year. The low frequency of such an event and the likelihood of it occuring only once rather than in multiple years, reduces the potential for long term adverse impacts.

Table 21 of Appendix B indicates the results of the HEP analysis based on the above stated assumptions. The assumed variation from baseline condition did not significantly change the Habitat Suitability Indices or acreages of the downstream habitat when the "with" and "without" conditions were compared. The AAHU's in Table 21 did not differ from the without the project in Table 11. Thus, there was no net change in AAHU's with the project.

e. Endangered Species:

The proposed project would not have any adverse impacts to any Federally listed threatened or endangered species since none occur in the study area. The unlisted plants that occur in the bog and cedar swamp would not be impacted by the proposed project. The preserves of the lake would probably be more attractive to migrating eagles or osprey for resting and/or feeding habitat.

2. Impacts to Recreational Resources

The proposed project modification to create a fluctuating storage pool will not impact upon active recreation, either existing or proposed, at the Rocky Hill and Greenbriar Recreation Areas. Analysis of existing topography and proposed water levels indicated that recreation activity at neither area is affected by the increased pool elevation. Creation of a seasonal pool will offer the opportunity for development of water oriented recreation activities, including swimming and limited boating; however, swimming and boating opportunities are presently supplied at nearby Buffumville Lake and other local lakes. For this reason, water-oriented recreation at Hodges Village would most likely be only of local interest. The Town of Oxford expressed interest during a scoping meeting for possible development of a swimming beach in conjunction with creation of the augmentation pool. Any such development would require a recreation cost sharing agreement with the town or other non-Federal agency.

Present hunting activity at the project occurs primarily on the upland areas surrounding the central floodplain and wetlands. The proposed project will have only minor impact on the upland areas of the reservoir.

3. Impacts to Aesthetic Values

With the proposed project, but without the proposed fish and wildlife habitat mitigation measures, approximately 180 acres of vegetated wetland will be cleared to create a permanent pool and seasonal higher augmentation pool. Existing vegetation will be removed up to two feet vertically above the augmentation pool to minimize additional tree kill and resulting maintenance problems due to water level fluctuation. At the augmentation pool's highest level in late spring, the reservoir will have the visual appearance of a natural lake. The visual impact of this change from present conditions to open water at the peak level of the augmentation pool is shown in Figures V-1 and V-2. The augmentation pool will be lowered gradually through the summer and fall to a permanent pool elevation 3.6 feet below the augmentation pool level. As the pool is lowered, the cleared banks of the pool will be exposed. Under the planned rate of drawdown, the water level will drop 1.4 feet by September and a total of 3.3 feet by the beginning of October. At this rate the major shoreline exposure will not occur until after the summer recreation season ends. However, during late fall and winter periods, approximately 17 acres of stripped land will be exposed. The visual impact of such an exposed shoreline is illustrated in Figures V-3.

4. Impacts to Historical/Archaeological Resources

A reconnaissance survey of the area within the proposed augmentation pool was performed in September 1983, by the Boston University Center for Archaeological Studies (Appendix C). No prehistoric resources were identified within the impact area, while the only historic features identified were the old road system, a set of ruined bridge piers, an abandoned railbed, and some 20th century trash scatters. The historic and archaeological value of these features is negligible; and it may be concluded that low flow augmentation would have no effect upon any significant historic or archaeological resources.

Although no significant historic or archaeological resources appear to be present within the area of the proposed low flow augmentation pool, several recorded historic period farmstead sites exist immediately outside the area and unrecorded prehistoric sites have a high probability of presence nearby. Construction impacts upon these sites could occur due to heavy equipment travel if equipment access to the construction area passed over them. Access by means of existing roads and the abandoned railbed would avoid such impacts. As access routes are determined, their potential archaeological impacts will be more fully assessed and any overland routes examined for presence of archaeological resources. It is anticipated that any potential impacts identified at that time can be readily avoided by modifications of the access routes.

5. Impacts to Socioeconomic Resources

Limited socioeconomic impacts would be experienced with implementation of the project. Both short and long term effects would be associated with the inclusion of the low flow augmentation at the Hodges Village Dam. Short term effects are not expected to be significant because the area is fairly isolated and not heavily utilized. The scope of the construction activity is minor and the construction period is short. However, some interference with recreational activities between March and November could be anticipated. Clearing, grubbing and/or stripping of approximately 180 acres that would be submerged with the presence of a pool provide the source of impacts. There may be disposal problems associated with this material if the mitigation measures discussed below are not implemented. The long term effects resulting from project implementation fall within the areas of aesthetics, recreation, access and institutional arrangements. The most significant of these is probably recreation followed by aesthetics. These impacts are discussed in detail above and therefore will not be addressed here. Access along the old Howarth Road would be eliminated along certain stretches during the summer when the pool would be at its highest levels. Some modification in the leasing agreements that the Corps has with the State would be required as a result of these changes.

The major effect outside of the project area would be the improvement of water quality downstream of Hodges Village Dam and Reservoir. The project would eliminate the septic problem that exists in the French River below Webster and Dudley (Massachusetts) during high temperature and low stream flow periods. With the elimination of the septic problem should go bad odor and high coliform concentrations experienced during summer months by the residents of the downstream communities in the vicinity of Putnam and Thompson, Connecticut.

C. Wildlife Mitigation

In accordance with 40 CFR 1502.16(h) and Engineering Circular (EC) 1105-2-117, measures were developed to mitigate the wildlife habitat loss of 680 Habitat Units. The proposed mitigation program includes the following two measures: (1) Reduction of the stripped augmentation pool, (2) Habitat improvements of marsh and upland areas.

The feasibility the development of inkind wetland replacement was also investigated (Appendix A). After the initial screening process, the creation of a maximum of 25 acres of new islands and peninsulas with interior marsh and shrub wetlands within the augmentation pool was determined to be technically feasible. This maximum acreage was determined to provide 186 Habitat Units (HU's)for 12 of the 15 evaluation species. This represents about 27% of the total 680 HU's lost. At a minimum cost of 2 million dollars for construction, this portion of the mitigation package was dropped owing the small return. The two measures cited above provided 321 HU's or 47% of the mitigation needs at a cost of about $500,000.

1. Stripped Augmentation Pool:

Implementation of the proposed project without mitigation as presented in Section V-B would create a 17 acre seasonally inundated zone around the perimeter of the permanent pool. The zone would be stripped of organic soil and alternately inundated and exposed for long term periods. This zone offers no value for wildlife and would create an aesthetic problem for most of the year.

The proposed mitigation would reduce this zone to an area of 7 acres by excavation of much of this area to elevations below the permanent pool elevation. This would also enhance access to the pool for wildlife by reducing the distance between the pool and surrounding cover types. This is of particular importance to species that utilize both areas (e.g. wood duck, box turtle, mink) and especially the juveniles, who would be particularly vulnerable to predation on an area with no cover.

Excavation of the exposed shoreline would also increase the permanent pool by about 10 acres. This would result in an habitat increase for snapping turtle and belted kingfisher which use the open water habitat.

2. Habitat Improvements:

Habitat improvements in the reservoir study area take the form of land reclamation, marsh improvements, and modification of the forestry management plan.

a. Land Reclamation:

Reclamation of two gravel pits were recommended to mitigate wildlife impacts. Both areas are located on Corps owned land that is immediately adjacent to Town and privately owned gravel pits. Excavation was permitted on Corps land to enhance the flood control storage capacity. One area is located immediately west of the Marshes A and B (Figure V-4) while the other is located on the eastern side of Dike #3 on the east side of the reservoir. The topsoil excavated from the stripping operations would be placed in both areas and seeded to prevent erosion. It is anticipated that the areas would initially be dominated by pioneering grasses and shrubs and later would naturally succeed to an upland forest habitat. Both areas include a total of 9 acres.

The initial increase in upland forb/grassland would add reproductive habitat to the American woodcock, whose populations in the reservoir are limited by the lack of this cover type. This would increase the HSI and acreage of woodcock habitat. As the area succeeds to shrub and forest over the project life the habitat units for this species would decrease. However, nine acres of shrub and later forest would be added to the reservoir to increase these habitats in future years.

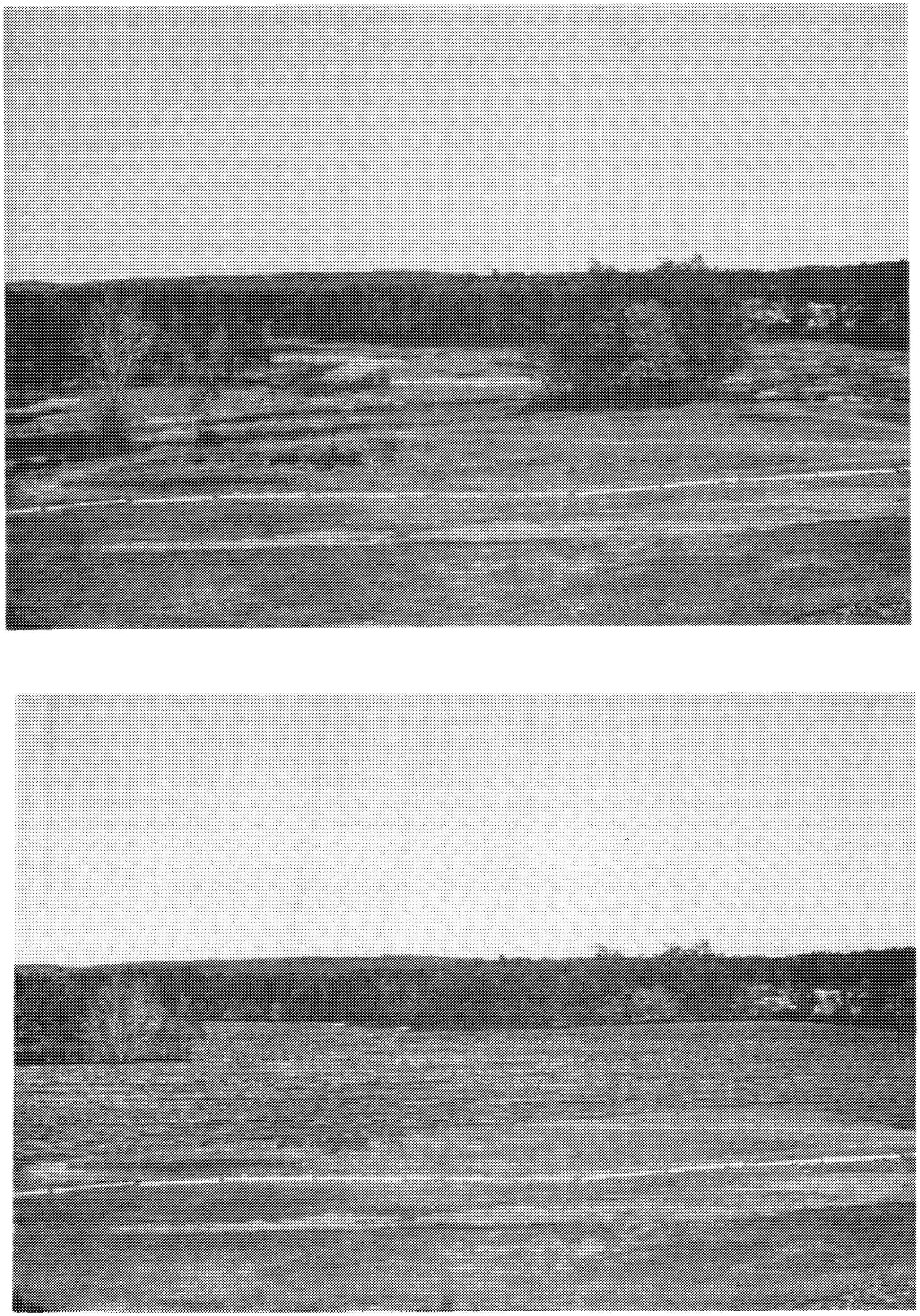


FIGURE V-1. Existing and post impact simulated views of the reservoir at the maximum proposed augmentation pool level, without mitigation measures, as viewed from the midpoint of the dam service road.

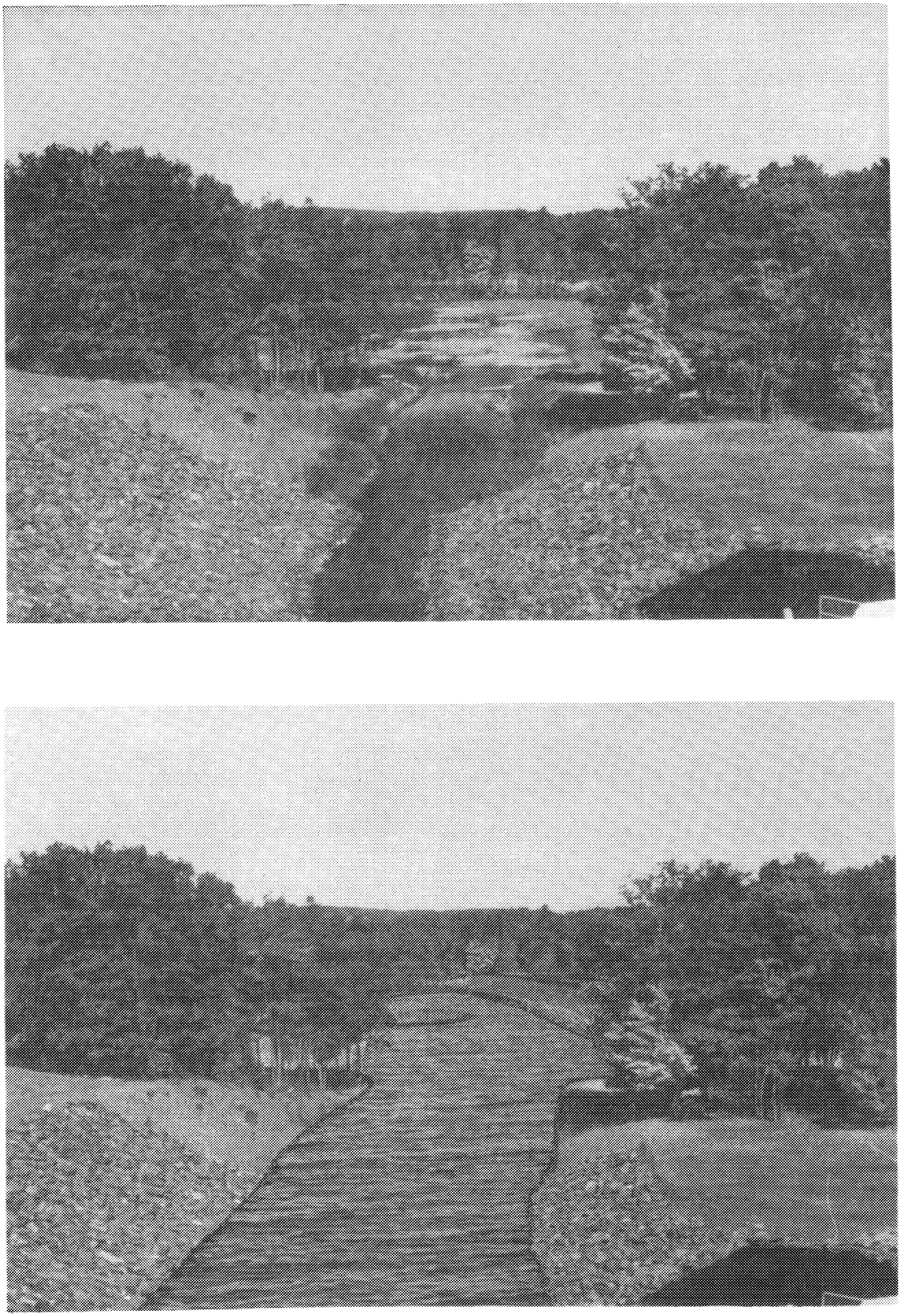


FIGURE V-2. Existing and simulated views of inlet channel with maximum proposed pool, without mitigation islands and peninsulas.

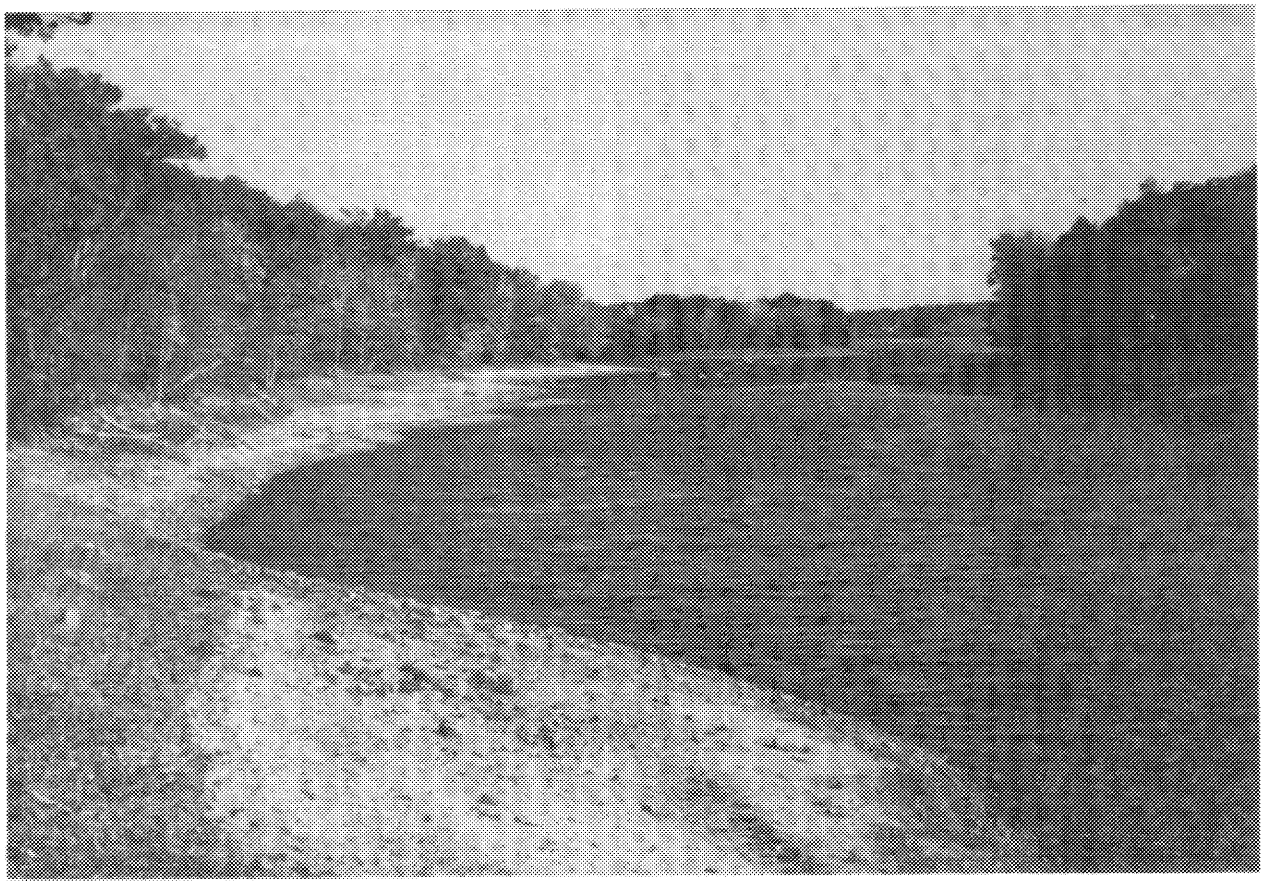


FIGURE V-3. Cambridge Reservoir, Waltham, Massachusetts, illustrates visual impact of exposed banks resulting from seasonal reservoir drawdown.

b. Marsh Improvements:

Three other areas of habitat improvement include the Marshes A, B and C exhibited in Figures V-4 and V-5. As mentioned above, these are anticipated to naturally develop into herbaceous marshes. A number of modifications would improve the habitat suitability, and therefore, the carrying capacity for wildlife.

The bottom elevations of Marshes A and B are such that they would be included within the permanent pool. It was determined that habitat of both marshes could be improved by increasing (1) the wetland edge around the pool and (2) the area with a water depth of 18" or less for ducks and wading birds. This would be accomplished for Marsh "A" by the construction of 5 ft wide ditches a total of 800 ft in length radiating from the central permanent pool (Figures V-5). Excavated fill would be used to reduce water depth along the waters edge which would promote cattail development. Habitat improvements for Marsh B require a different strategy because of its larger size. Construction of four enlarged hummocks or islands within the permanent pool would increase the wetland edge and create larger shallow areas (Figure V-5). The islands, which would rise about 1 foot above the augmentation pool would reduce augmentation storage. The loss could be compensated by excavation of materials above the permanent pool and thereby enlarge the wetted areas of the entire marsh (Figure V-5). The more extensive shallow areas between the islands would encourage growth of good wetland edge vegetation such as cattails and pickerel weed.

Finally, Marsh "C" would be inundated only during augmentation storage under the proposed plan. This lack of permanent water for most of the year and the low edge reduced the wildlife habitat suitability of this area. Deepening the marsh by excavation within the confines of the cover type but below the permanent pool elevation (Fig V-5) would establish a permanent pool and increase the edge of the highly assymetrical shape of the pool, which would both contribute to a concurrent increase in habitat suitability and area.

Improvements of the three marshes would add about 35 acres of high quality habitat for the species listed in Tables A-4 and A-13 of Appendix A. Evaluation species likely to benefit from the marshes include mink, muskrat, snapping turtle, black and wood ducks, belted kingfisher and swamp sparrow. Rocks would be scattered throughout the shallow water areas to provide resting areas for salamanders, frogs and turtles. The Habitat Suitability Indices for each evaluation species are listed in Tables E-1 through E-15 of Appendix A. Shrubs near open water would provide nesting and perching areas to swamp sparrow and yellow warbler, and brood cover for ducks and other species which is limiting to populations in the reservoir existing wetlands.

c. Modification to the Forestry Management Plan.

The final habitat improvement measure includes modification to the forestry management plan (CE, 1981) discussed in Section IV. As discussed above, a net loss of upland mixed oak forest would be anticipated after 50 years of forestry management. This would impact on wildlife species which use this habitat. In terms of the evaluation species, red-backed vole, wood frog, wood duck and woodcock would lose the most because they generally do not use the upland pine forest cover type that would replace the deciduous cover. Downy woodpecker would also lose habitat because the low number of snags and high basal area in pine stands make the latter less suitable for this species than upland deciduous forest. Therefore, 90 acres of oak forest be retained in this cover type by a weeding and thinning program to increase the habitat for the above species. This would improve habitat only marginally for dusky salamander because of the low cover (and hence, HSI) associated with upland oak forest in the reservoir. Pine thinning operations could include measures to increase the number of snags and reduce the basal area to the values associated with the decidous forest. This would increase the HSI of the pine forest for downy woodpecker. Based on the HEP analysis the low debris cover in upland deciduous forest areas reduced the value of this habitat for red-backed vole. As part of a thinning program slash could be encouraged to achieve 20-25% ground cover in this cover type. Finally the HEP analysis determined the low acreage of upland forb/grassland was limiting at the reservoir area to American woodcock which use these area for their courtship activities. This cover type could be increased during future years by clear cutting larger areas to maintain about 30 acres of this cover type within the study area.

The changes in existing vegetated cover type acreages with proposed mitigation are indicated in Table 10.2 of Appendix A through the study period (see Addendum). The project design and mitigation proposals would partially offset the lost acreages of wetland and upland cover types listed in Table V-2.

Improvement of marshes A, B and C would involve 35 acres. It is anticipated that 3 acres of the 25 acres "Freeboard" area above the augmentation pool would develop into palustrine shrub wetland. This total of 38 acres when subtracted from the initial loss of 130 acres of wetland yield at net loss of 92 acres.

The changes in upland acreage are also indicated in Table 10.2 (Addendum to Appendix A). The 36 acres of the upland vegetated cover types that would be removed with the wetlands would be partially offset by the development of 31 acres of new upland cover types. The above described land reclamation proposals would add nine acres of vegetated habitat to the study area. As indicated above this would initially develop into upland forb/grubbed and later succeed to shrub and forest. In addition, the remainder of the freeboard area (22 acres) is anticipated to develop into upland scrub/shrubland by year 35. This yields a net loss

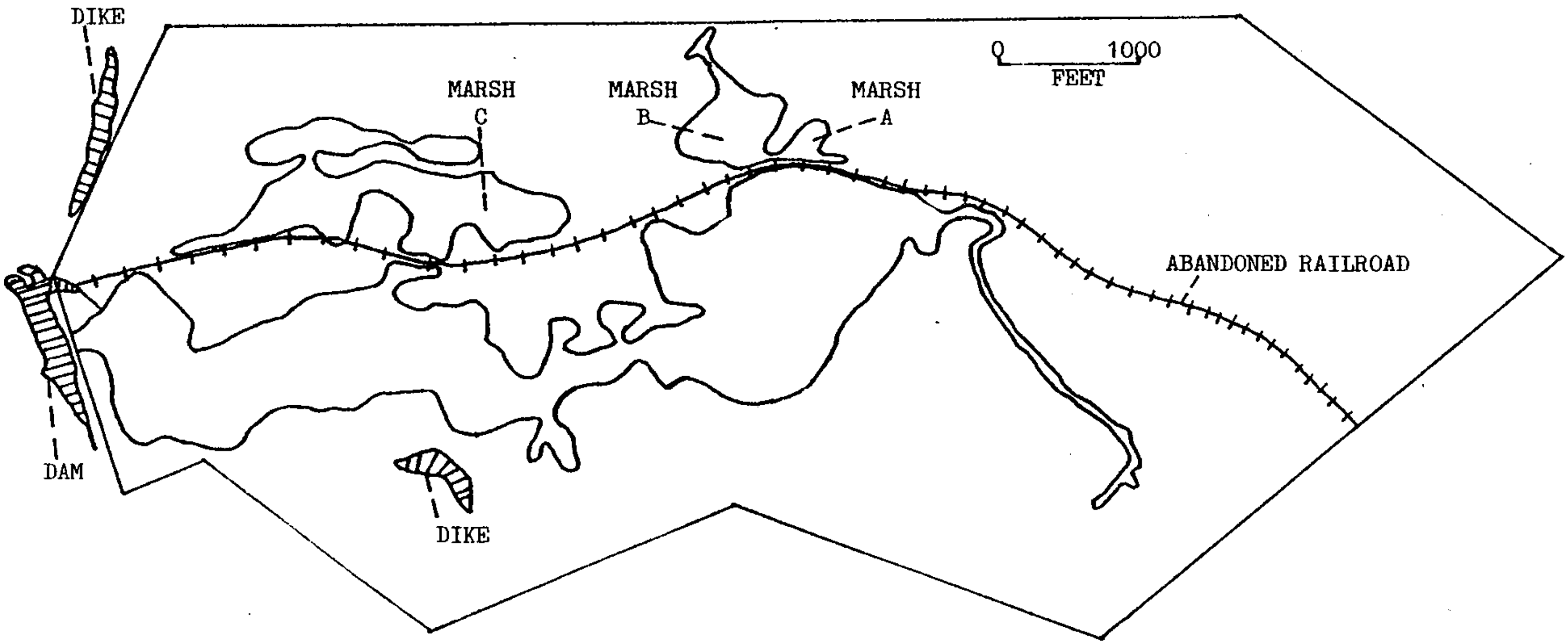


Figure V-4 Location of Marshes A, B and C.

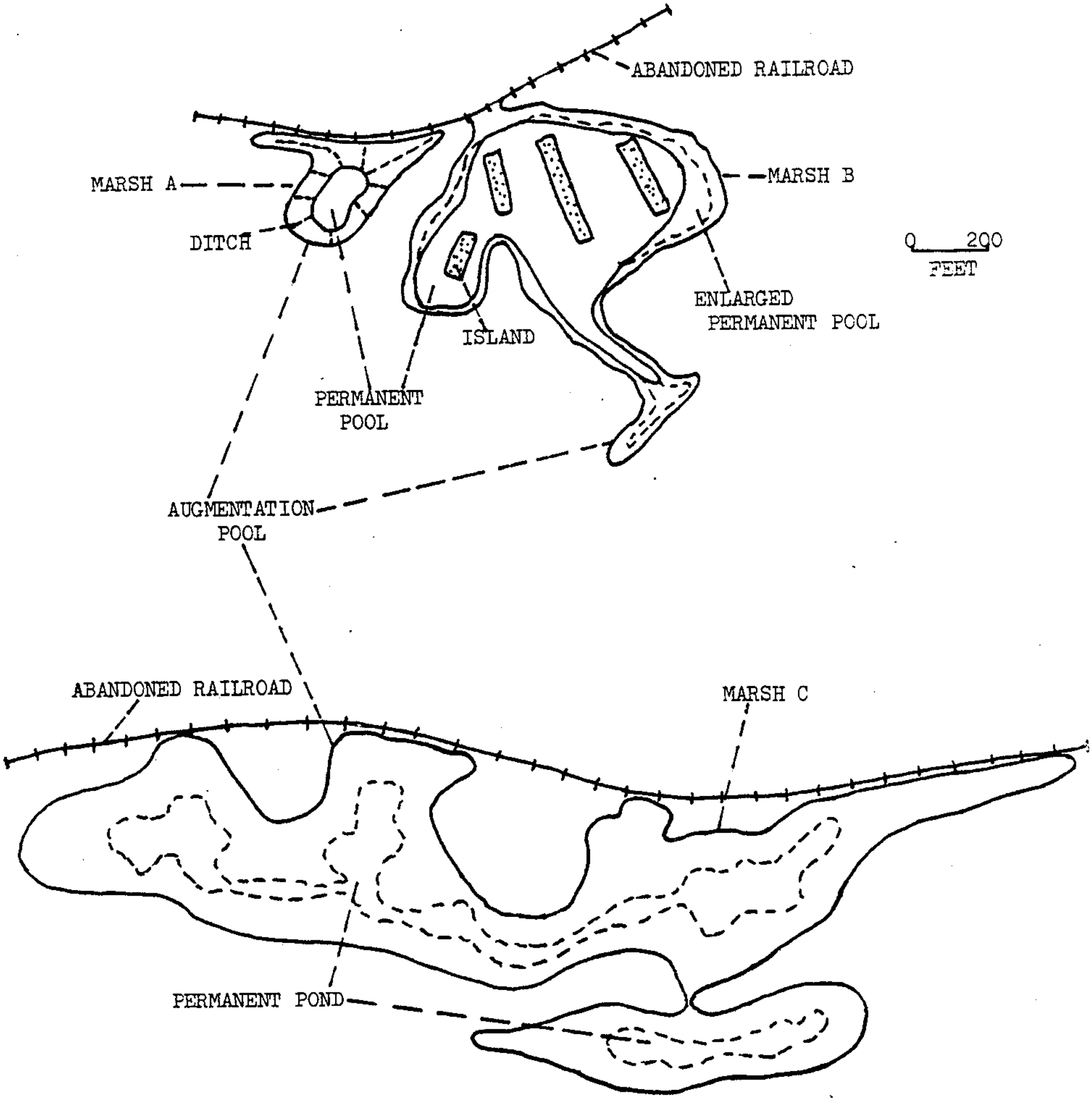


Figure V-5 Mitigation measures for Marshes A, B and C (See Figure V-4 for locations of marshes within Study Area).

of 5 acres of upland habitat. The remainder of the upland cover type changes exhibited in Table 10.1 are primarily due to the above described modification of the forestry management plan complicated by the simultaneous action of natural succession.

3. Impacts to Wildlife with the Proposed Mitigation.

a. Application of the HEP Analysis.

The future acreages of the cover types previously discussed (Section V-B) and exhibited in Table 9.1 (Appendix A) were modified according to the mitigation recommendations (Table 10.1 of Appendix A). These acreages combined with changes in Habitat Suitability Indices were used to calculate future Habitat Units (HU's) with the proposed mitigation plan for each species and target year. These are displayed in Tables E-1 through E-15 of Appendix A. The resulting annual average habitat units (AAHU's) are shown in Table V-5 with the AAHU's calculated for the "with" and "without" project conditions. Comparison of the three AAHU values summarizes the amount of habitat lost and gained without and with the mitigation program.

The table indicates that all evaluation species except mink, dusky salamander and green heron gained AAHU with the proposed mitigation measures. American woodcock, red-backed vole, downy woodpecker and wood frog showed the highest gains while there were moderate increases for snapping turtle, wood duck, and muskrat. Black duck, broad-winged hawk, belted kingfisher and warbler showed only slight increases due to the measures. Overall, belted kingfisher, American woodcock, snapping turtle, red-backed vole and muskrat showed increases in AAHU over existing conditions. The remaining species showed a net decrease from the without project conditions.

Table V-5 also indicates that of the 680 AAHU's lost from the project 321 would be replaced by the mitigation proposals. Hence the program recovers approximately 47% of the project losses without mitigation. The actual AAHU's gained may be plus or minus 25% because of the (1) conservative estimates of habitat conditions assumed and (2) potential under achievement of the goals established by mitigation plan (Appendix A).

A discussion of the impacts to the other species associated with the evaluation species may be found in Section 12 of Appendix A.

b. Impacts of Flood Control Operations on Wildlife with the Proposed Mitigation.

Flood control operations at Hodges Village would continue as it has in the past after implementation of low flow augmentation. Storage would be held on top of the permanent or augmentation pool depending on the time of the year. Based on storage experienced during storms from the 10 year

TABLE V-5[1]

AVERAGE ANNUAL HABITAT UNITS OVER 100 YEARS

EVALUATION SPECIES	WITHOUT PROJECT (A)	PROJECT WITHOUT MITIGATION (B)	NET CHANGE (B-A)	PROJECT WITH MITIGATION (C)	NET CHANGE[2] (C-A)
Red-Backéd Vole	123	74	-49	145	+22
Mink	391	292	-99	286[3]	-105
Muskrat	22	16	-6	26	+4
Dusky Salamander	114	42	-72	38	-76
Wood Frog	257	191	-66	241	-16
Snapping Turtle	34	39	+5	62[4]	+28
Green Heron	128	57	-71	54	-74
Black Duck	60	22	-38	27	-33
Wood Duck	91	48	-43	67	-24
Broad-Winged Hawk	653	532	-121	541	-112
American Woodcock	179	145	-34	230	+51
Belted Kingfisher	36	104	+68	107[4]	+71
Downy Woodpecker	369	297	-72	355	-14
Yellow Warbler	40	23	-17	24	-16
Swamp Sparrow	119	54	-65	54	-65
TOTAL AAHU's	2616	1936	-680	2257	-359

(1) Modified from Table 11.1 of Appendix A.

(2) The values in this column differ from those in Table 11.1 because the AAHU's contribution of the islands and/or peninsulas have been subtracted for the following species: red-backed vole - 2; mink - 13; muskrat - 11; snapping turtle - 13; green heron - 23; black duck - 12; wood duck - 5; broad-winged hawk - 8; belted kingfisher - 10; yellow warbler - 7; swamp sparrow - 18.

(3) Removal of the peninsulas eliminates use of the 88 acre permanent pool by mink. The AAHU's in Table 11.1 were calculated using the permanent pool acreage (88) plus the 100 meter band (111 acres) around the permanent pool (= 199 acres). In addition, the AAHU contribution by the permanent pool (82) was subtracted.

(4) These values have been modified from those in Table 11.1 because the removal of the islands and peninsulas resulted in an increase in pool acreage from 88 acres to 113 acres. Hence, 6 AAHU's were added to snapping turtle and 18 AAHU's to belted kingfisher.

period 1973 - 1982, the majority of flood storage events occurred from the January through March period which would probably not have any long term adverse impacts on wildlife or its habitat which are using the wetlands in the marshes "A", "B" and "C". However, if a large storm such as the one experienced in June 1982 occurs during critical periods such as the nesting and brooding periods of most species of wildlife (usually May - August), adverse impacts may result. The more mobile species such as adult birds or mammals would probably escape the flood waters. Nests or burrows which contain the immobile eggs or relatively immobile young probably would be inundated. Ducks have been reputed to renest after the first nest is destroyed (Coulter and Miller, 1968). Otherwise, most young or eggs may be lost for that particular year. It is anticipated that after the flood waters recede the displaced wildlife that survived would recolonize their prior habitats. The significance of the impacts to wildlife populations over the long term is reduced by the low frequency of such events during critical nesting and brooding periods. Past flood storages in Hodges Village have not resulted in any significant impacts to wildlife (CE, 1976).

4. Impacts of the Mitigation Plan to Fisheries Resources.

Once the pool is constructed the amount of available fishery habitat in the permanent/augmentation pools with mitigation would be less than that without mitigation. As described above, the augmentation pool area exclusive of the marshes on the west side of the railroad bed without mitigation would be 155 acres while the permanent pool would be 103 acres. Excavation of the fluctuation zone around the permanent pool would increase the permanent pool by 10 acres. Accordingly, the revised time-weighted area of the potential fishery habitat would be 155 acres x 33% of year + 113 acres x 67% of year which equals about 127 acres. If the HSI's for each species are assumed to be the same, the resulting Habitat Units would be higher due to the higher acreage (Table 23, Appendix B). Table V-6 indicates the change in average annual habitat units (AAHU's) from without project conditions. The total change was a net increase of 324 Habitat Units (361-37) compared with a net increase of 304 Habitat Units (341-37)without the mitigation plan. Thus, the enlarged pool results in a net gain of 20 AAHU's.

The stripped and augmentation pool would not initially provide any cover for fish. Large boulders that are recovered during earth moving activities or anchored artificial reefs would be strategically placed throughout the pool area to provide cover and substrate for forage. Also, the addition of organic material around the edge and the debris that would follow would eventually increase aquatic vegetation and cover in the littoral zone around the permanent pool. This would enhance fishery habitat over the long term.

TABLE V-6
AVERAGE ANNUAL HABITAT UNITS (AAHU) OF FISH SPECIES WITH PROJECT WITH WILDLIFE MITIGATION FOR THE UPSTREAM STUDY AREA

Evaluation Species	AUHU with project	AAHU without project	Change AAHU
Largemouth bass	90.76	9.13	81.63
Bluegill	94.34	9.02	85.32
White sucker	101.65	8.91	92.74
Bullhead	74.15	9.57	64.58
TOTAL	360.90	36.63	324.27

5. Impacts to Recreational Resources with Mitigation Plan.

The proposed project with mitigation would not impact the Greenbriar or Rocky Hill Recreation Areas, which is located in the northern end of the reservoir. The elevation of both recreation areas is high enough to avoid any impact from the increased pool elevation.

Clearing a portion of the reservoir to create the augmentation pool will alter existing fish and wildlife habitat. This alteration will have an impact on the hunting, trapping and fishing resources of the project.

The mitigation plan will convert acres of vegetated wetland to open water and seasonally exposed gravel banks. Based on data developed through the Fish and Wildlife Habitat Evaluation Procedures (HEP) the opportunities for trapping muskrat may slightly increase while mink habitat would decrease. Habitat for wood duck and black duck would also decrease, indicating reduced opportunities for hunting of waterfowl. However, American woodcock populations are expected to increase providing more hunting opportunities for this species.

The proposed project will alter upland habitat only on the fringes of the augmentation pool. There should be no significant change in hunting of pheasants. The primary variable in pheasant hunting is the quantity stocked annually by the Commonwealth of Massachusetts.

Creation of the augmentation pool will convert the fisheries habitat from a riverine to a lake environment. The water surface will also increase to less than nine fold. The result should be a significant warm water fishery resource for the region when the lake populations stabilize.

6. Aesthetic Values with the Mitigation Plan.

Due to the project requirement to remove organic soil from the augmentation pool to achieve water quality objectives, there will be little or no revegetation of the drawdown zone between the elevation of the peak augmentation pool and the permanent pool. The mitigation plan would reduce this zone from 17 to 7 acres. However, the exposed drawdown rim during the fall and winter months would still create a vivid contrast to the surrounding landscape (see Figure V-3).

VI. COORDINATION

A. Public Involvement

The public involvement by the New England Division (NED) included numerous coordination meetings with local, State, and federal agencies, concerns groups and individuals. In addition, coordination and workshop meetings were held by Environmental Protection Agency (EPA) from 1971 to the present. Day and evening public workshop meetings were held on 13 April 1982 at Town Hall, Oxford, Massachusetts. A "Notice of Intent to File" and an Environmental Impact Statement was published in the Federal Register on 24 September 1982. The New England Division held day and evening public scoping meetings on 12 January 1983 at Town Hall, Oxford, Massachusetts. The New England Division has met quarterly from 1978 through the present with the State-EPA Agreement (SEA) Working Group which is composed of appropriate representatives from the States of Massachusetts and Connecticut, EPA, New England Interstate Water Pollution Control Commission and interested regional, local officials including the town of Oxford and private entities. Pertinent correspondence regarding this coordination may be found in Section IX.

The Habitat Evaluation Procedure (HEP) analysis for fish and wildlife was accomplished by a joint study team composed of representatives for the Corps, U.S. Fish and Wildlife Service, and the Massachusetts Division of Fisheries and Wildlife.

The following people and agencies were consulted during the development of this project:

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B. Compliance with Environmental Protection Statutes

1. Archaeological and Historic Preservation Act, as amended, 16 U.S.C. 469 et seq. * N/A

2. Clean Air Act, as amended, 42 U.S.C. 7401 et seq. Review of this document will constitute compliance with this Act.

3. Clean Water Act (Federal Water Pollution Control Act), as amended, 33 U.S.C. 1251 et seq. Review of the attached 404(b) Evaluation will constitute compliance with this Act.

4. Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 et seq. N/A

5. Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq. The U.S. Fish & Wildlife Service has determined that no Federally listed endangered species occur in the project area. Review of this document will determine if this Act is being complied with.

6. Estuary Protection Act, 16 U.S.C. 1221 et seq. N/A

7. Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq. Review of this Assessment by the Department of Interior will constitute compliance with this Act.

8. Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq. Review of this document will constitute continuing compliance with this Act.

9. Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-4 et seq. Review of this document by the Department of Interior will constitute compliance with this Act.

10. Marine Protection Research and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 et seq. N/A

11. National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq. Review of this document will constitute continuing compliance with this Act.

12. National Environmental Policy Act of 1969, as amended, 42 U.S.C. 432 et seq. Review of this document will constitute continuing compliance with this Act.

13. Rivers and Harbors Appropriation Act of 1899, as amended, 33 U.S.C. 401 et seq. N/A

14. Watershed Protection and Flood Prevention Act, as amended, 16 U.S.C. 1001 <u>et seq.</u> N/A

15. Wild and Scenic Rivers Act, as amended 16 U.S.C. 1271 <u>et seq.</u> N/A

16. Executive Order, 1990, Protection of Wetlands.
No alternative to the proposed project were found to be feasible to meet the project objectives. Erosion Control Measures have been proposed to minimize short term impacts term and habitat development would mitigate long term impacts.

* N/A - Not Applicable

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Gary R. Sanford Manager Sanford Ecological Services	Ecologist	Ph.D. Ecology - Botany M.A. Biological Sciences B.A. Botany	Consultant, Senior Scientist, Assistant Professor and Researcher for Environmental Programs, total 13 years.	Contract Wildlife Habitat Evaluation Procedure Study; Appendix A.
John Wilson	Archaeologist	M.A. Anthropology B.A. Anthropology	Staff Archaelogist, 1 year; Archaeologist Consultant, 3 years; Division Archaeologist, Planning Division, CE, 6.5 years.	EIS Preparation
Ricardo J. Elia	Archaeologist	Ph.D. Anthropology	Archaeological Consultant, 7 years.	Archaeological Reconnaissance Study; Appendix C.
Charles Freeman	Landscape Architect	M.L.A. Landscape Architecture B.A. Biology	Environmental Studies, Recreation Planning, Planning Division, CE, 8 years.	EIS Preparation.
Diana Hales	Geography	B.A. Geography	Social/Economic Studies, Planning Division, CE, 7 years.	EIS Preparation.

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IX PERTINENT CORRESPONDENCE

The Commonwealth of Massachusetts

Water Resources Commission

State Office Building, Government Center

100 Cambridge Street, Boston 02202

I OF THE DIRECTOR
VISION OF WATER
LLUTION CONTROL

October 2, 1970

Mr. John Wm. Leslie, Chief
Engineering Division
Corp of Engineers
424 Trapelo Road
Waltham, Massachusetts

Re: Request for low flow study,
French River, Thames River Basin

Dear Mr. Leslie:

This Division has made preliminary estimates of the need for flow augmentation in the French River below Webster, Massachusetts. It has been determined that a minimum flow of 36 Cfs at the Webster gauge would be required to attain Water Quality Standards assigned this reach of the River. This figure based on secondary treatment of all municipal wastes and equivalent treatment of industrial wastes prior to discharge.

It is requested that you examine the possibility and feasibility of utilizing storage in the Buffumville and/or Hodges Village Reservoirs to provide this minimum flow. By copy of this letter, we are apprising the Federal Water Quality Administration of this request.

If members of your staff assigned this project have any questions, I would suggest they call Mr. Slagle of this Division.

Very truly yours,

Thomas C. McMahon

Thomas C. McMahon
Director

TCM/WAS/kp
cc: Mr. Bartlett Hague
New England Basins Office
Federal Water Quality Administration
240 Highland Avenue
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

December 30, 1975

Mr. Carmine Ciriello, Project Chief
Plan Formulation Branch
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Ciriello:

This letter will confirm discussions between staff members of the Corps, Massachusetts Division of Water Pollution Control and EPA, held on December 8, 1975, for the purpose of outlining future steps for dealing with the water quality problems of the French River.

Based upon these discussions, the following was established:

1. Preliminary water quality evaluations by the Massachusetts Division of Water pollution Control and EPA indicate that treatment levels exceeding best available waste treatment technology economically achievable may be required in order to secure the national goal of fishable-swimmable waters in the French River.

2. Stream low flow augmentation is a viable alternative complimenting best available waste treatment technology economically achievable for achieving water quality objectives.

3. The Corps of Engineers may be able to provide augmented streamflow from the existing flood control reservoir at Hodges Village. However, it would be several years before this could be accomplished.

4. EPA and the Division of Water Pollution Control will prepare a status report on alternatives for achieving water quality objectives in the French River. The report should be available within a few weeks.

In summary, then we recommend the Corps undertake feasibility studies on providing streamflow regulation for water quality control from the Hodges Village Reservoir. We look forward to cooperating with the Corps in these studies.

Sincerely yours,

Walter M. Newman, Chief
Water Quality Branch

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ENERGY RESEARCH, DEVELOPMENT AND DEMONSTRATION

BOARD OF VISITORS TO THE UNITED STATES COAST GUARD ACADEMY

July 9, 1976

Colonel John H. Mason, Division Engineer
Corps of Engineers
Department of the Army
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Colonel Mason:

Since it has been determined that low flow augmentation would be necessary for the French River and its waste treatment problems, I would be most appreciative if the Corps were to undertake a study to provide this low flow augmentation for the French River.

Please accept my sincere thank you for your consistently kind and immediate cooperation with my District office in Norwich. Stanley Israelite has told me many times of the efficient way in which you and your staff handle the many matters that come before us in the District.

Sincerely yours,

CHRISTOPHER J. DODD
Member of Congress

WCB
P. 7

UNITED STATES
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April 10, 1978

Division Engineer
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Dear Sir:

This planning aid letter has been prepared to assist you in your planning efforts on the modification of the Hodges Village Reservoir, Oxford, Massachusetts. It has been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). Some of the following information is adapted from an earlier Fish and Wildlife Service Report dated March, 1958.

PROJECT DESCRIPTION

The Hodges Village dam and reservoir is a single purpose flood control project on the French River. It is located in the town of Oxford, Massachusetts, in the upper Thames River Basin.

The project lies in the rolling hill section of south central Massachusetts. It is situated in an interval of a north-south valley flanked by low hills. Topographic relief in the vicinity of the project varies from elevation 460 to over 800 feet (msl). French River is approximately 22 miles in length and drains a 30 square-mile area above the project site. The river averages 20-40 feet in width within the project site. The flow is sluggish to moderately fast with many reaches that are deep and smooth flowing. Stream depth varies from one to several feet, depending upon the gradient. The stream bottom has variable substrates composed of mud, gravel and rubble. Some industrial and domestic pollution enters the main stem upstream from the dam site. Wellington Brook, the principal tributary within the reservoir area, varies in width from 6 to 15 feet, and flows through the two dry Pope Pond flowages, both of which are within the maximum flow line. Wellington Brook is a non-turbid, unpolluted stream.

Soils of the area are mainly of the Gloucester type, belonging to the Gray-Brown Podzolic Great Soil Group, predominately dark brown in color and coarse in texture. Development of the soil has been principally from material derived from crystalline schists and gneisses and accumulated by glacial action. Some peat deposits exist in the lower basin within the reservoir site.

PROJECT PLAN

The U. S. Environmental Protection Agency (EPA) and Massachusetts Division of Water Pollution Control evaluated water quality tests on the French River. They determined that treatment levels exceeding best available and economically achievable waste treatment technology would be required in order to secure the national goal of Class B waters (i.e., swimmable, fishable) by 1983.

The Corps of Engineers (CE) was authorized to undertake a feasibility study on providing streamflow regulations for water quality control from the Hodges Village Reservoir. This authority was provided by Section 216 of the Flood Control Act of 1970, Title II of Public Law 91-611. The EPA estimated potential reduction in the refined treatment levels would result in an annual savings in treatment cost of $172,000.

The plans developed for the project include the modification of the existing Hodges Village Flood Control project to accommodate an augmentation pool to be used for water quality improvement. The minimal acceptable volume of water for this purpose would provide 22 cfs flow during critical low flow periods (July and August), and inundate approximately 275 acres (el. 478 msl). The maximum acceptable volume (before it interferes with flood storage) would provide 36 cfs and inundate approximately 425 acres (486 msl). The plan also calls for clearing and grubbing the area to be inundated in order to maintain high water quality standards.

In addition, we understand that advanced treatment at Webster-Dudley, along with the removal of dams below Webster, would be necessary in order to provide a viable means towards meeting the 1983 goal. The major beneficial effort of dam removal is to increase stream velocity which, in turn, increases re-aeration. The sludge deposits which have accumulated behind the dams would be washed away, reducing the major algae problem areas.

The Perryville Dam in Webster presents the combined problems of sludge deposits and potential algae problems. The mill which used this dam burned down several years ago. Removal of this dam, however, would simply move the problems downstream to the Wilsonville impoundment in Connecticut. There are three more dams downstream of Wilsonville before the French River joins the Quinebaug. Removal of all of these dams and sludge deposits should be considered. As long as any remain, nutrient removal will definitely be required at Webster-Dudley. The major impact from sludge removal would be a temporary increase in turbidity, smothering of aquatic organisms and an increase in the biological oxygen demand. If this action is considered, the sludge deposits should be removed before the dams.

NOT
USED

FISHERIES SECTION

Without the Project

The present fishery in the project area consists entirely of warm-water species, namely: chain pickerel, yellow perch, brown bullhead and bluegill. Historically, water quality has been such that trout stocking programs would have been futile. Recent years have seen improvement in water quality to a point where trout stocking is contemplated by the Massachusetts Division of Fisheries and Wildlife.

In 1975, it was estimated that 3,800 persons utilized the reservoir area for fishing. We anticipate this figure to increase yearly as the demand for this type of recreation increases. We would also anticipate the initiation of a trout stocking program especially in the upper reaches of the French River.

Water quality problems in the lower portion of the watershed (Connecticut) preclude heavy usage at this time. Our investigation reveals a latent demand by several thousand people who would utilize the river for all potential forms of recreation once conditions are improved.

It is estimated by Connecticut fishery personnel that this section of river could be stocked with approximately 3,000 brook and brown trout which would support an estimated 2,200 man-days of fishing. Before this potential could be realized, however, public access, which is now lacking, would have to be provided.

With the Project

Efforts to improve water quality above the reservoir will enhance the opportunity for a trout stocking program. These improvements, however, will occur with or without the project. Fishing potential of the recreation pool will be directly related to the size of the pool; however, the planned clearing and grubbing will drastically reduce the overall carrying capacity of this area. As previously indicated, the lower portion of the river could provide an estimated 2,200 man-days of fishing with a latent demand of several thousand man-days for other recreational uses.

WILDLIFE SECTION

Without the Project

The dominant vegetative types are mixed hardwoods and softwoods, with mixed oaks predominating in the hardwood group and white pine in the softwood group. Wooded swamps are characterized mainly by red maple, American elm and black alder with an understory of blueberry, dogwood, arrow-wood, buttonbush and other wetland species. A 25-acre, white cedar swamp and several small bogs are included on the site.

Open grass marsh or open wet meadow is found on the old Howarth Mill Pond and Lower Pope Pond flowages and on the wide flat at the junction of French River and Wellington Brook. This vegetative type is characterized mainly by soil waterlogged to its surface or within a few inches of its surface.

Agriculture is unimportant and there is only one small 6-acre hay field in the project area. The remaining acreages are composed of homesites (comprising about 50 acres, most of these are new developments), gravel pits, old fields and upland shrubs.

Stumpy pond is included within the maximum flow line. It is clear, spring fed and extremely shallow, supporting a lush growth of submerged and floating aquatic vegetation, consisting of Typha spp, Potomogeton spp., Carex spp., Pontederia spp. and Scirpus spp.

Several game animals and numerous non-game species make use of the site. Deer range the area, but since it is located in a region of the state supporting a low deer population, their use is light. Habitat suitable for grouse is extensive, covering a large portion of the site. The mast-producing oaks, uneven-aged woodland and much edge type are habitat features important in maintaining a grouse population. Suitable cover for cottontails is less extensive and for the most part is confined to the lower slopes and flatland. Much of the oak and white pine on the upper slopes is unsuited to cottontail occupancy because of the general lack of understory and ground cover. Gray squirrels are well distributed over the oak-covered slopes, and some cover suitable for woodcock is located along French River and Willington Brook. Suitable muskrat habitat exists along slow-flowing, meandering segments of the French River, along a short reach of Wellington Brook and in portions of drainage ditches. In addition to the muskrats, minks and otters occasionally range the site. Raccoons and foxes range freely through the section.

Waterfowl make use of the slow flowing portions of the French River and the drainage ditches. The main stem lacks a marshy or feathery edge and is also deficient in floating and submerged vegetation. Shrubby bank cover is generally heavy. There is considerable human activity in the project area so that ducks are disturbed constantly. Stumpy Pond offers a small amount of suitable waterfowl habitat. Several acres of waterfowl habitat existed at the upper end of Howarth Mill Pond before the dam was breached. Wood duck nesting boxes that had been erected in the shallow marsh are now on wet meadow. Before the drainage project, several acres of good shallow waterfowl and muskrat marsh were found on Lower Pope Pond flowage. The major limiting factor for waterfowl production is the lack of water during critical periods; i.e., nesting and migration periods, and human disturbance.

The Massachusetts Division of Fisheries and Wildlife has a 25-year license for 676 acres which it managed for hunting, fishing, and other forms of recreation. The Division annually releases approximately 500 pheasants and 100-150 hare at the reservoir. It was estimated that in 1975, the management area supported 6,300 man-days of hunting for all species.

A wide variety of non-game species utilize the project area. Table 1 lists those species known or suspected to occur within the flood control area.

Total visitations for non-consumptive recreational purposes in 1975, approximated 55,000 visitor days.

Table 1. Non-game species known or suspected to occur.

Avifauna*	Amphibians	Reptiles
Green heron	Newt	Snapping turtle
Canada goose	Spotted salamander	Wood turtle
Mallard	Dusky salamander	Spotted turtle
Black duck	Red backed salamander	Musk turtle
Wood duck	Two-lined salamander	Painted turtle
Red-tailed hawk	American toad	Red-bellied snake
American kestrel	Fowler's toad	Delay's snake
Ruffed grouse	Spring peeper	Water snake
Ring-necked pheasant	Grey tree frog	Garter snake
Spotted sandpiper	Pickerel frog	Ribbon snake
Rock dove	Leopard frog	Hognose snake
Mourning dove	Wood frog	Ringneck snake
Yellow-billed cuckoo	Green frog	Black racer
Black-billed cuckoo	Bullfrog	Green snake
Great horned owl		King snake
Belted kingfisher		
Common flicker		
Hairy woodpecker		
Downy woodpecker		
Eastern kingbird		
Eastern phoebe		
Least flycatcher		
Eastern wood pewee		
Tree swallow		
Bank swallow		
Rough-winged swallow		
Barn swallow		
Blue jay		
Common crow		
Black-capped chickadee		

Table 1 (continued)

Avifauna*	Amphibians	Reptiles
Tufted titmouse		
White-breasted nuthatch		
House wren		
Mockingbird		
Gray catbird		
Brown thrasher		
American robin		
Wood thrush		
Veery		
Cedar waxwing		
Starling		
Red-eyed vireo		
Black and white warbler		
Yellow warbler		
Chestnut-sided warbler		
Prairie warbler		
Ovenbird		
Common yellowthroat		
American redstart		
House sparrow		
Redwinged blackbird		
Northern oriole		
Common grackle		
Brown-headed cowbird		
Scarlet tanager		
Cardinal		
Rose-br. grosbeak		
Indigo bunting		
Purple finch		
American goldfinch		
Rufous-sided towhee		
Field sparrow		
Swamp sparrow		
Song sparrow		

There are no known or suspected rare or endangered species in the project area.

*Probable nesting species only, includes game birds.

With the Project

The project as described in the POS would have disastrous effects on wildlife resources. Clearing and grubbing of 425 acres in the reservoir area would create a rather sterile environment for wildlife resources. The lesser of the plans, i.e., 22 cfs, would require clearing of an estimated 190 acres, which would proportionately reduce the impacts on wildlife resources.

The net result would be the elimination of a diverse complex of habitat types which currently support a wide variety of wildlife species. Commensurate with this loss is the reduced opportunity for observation, hunting, trapping, and other wildlife recreational pursuits in the area.

Since the planning agency does not propose to hold a significant permanent pool at this reservoir, we might expect some wildlife values to be retained on the lower portion of the reservoir area; however, it would be insignificant compared to the total area.

DISCUSSION

It is obvious that much more information will have to be provided before this Service can fully evaluate the total impacts of this project. A critical unknown impact is the removal of the dams below Webster, which we understand to be an integral part of the water quality improvement scheme. We request that as much information as possible regarding this aspect of the project be provided to us for analysis in our final report. In addition, details on advanced treatment plant construction and alternatives such as land disposal methods must be provided.

A major alternative, which has not been considered at all, is the construction of dikes and holding ponds within the reservoir area. This, in effect, would create a tertiary treatment impoundment. We feel that this alternative has potential in helping to relieve the water quality problems. It would also have the least environmental impact and could provide some real benefit to fish and wildlife resources. We would certainly consider this alternative as part of the environmental quality plan based on available information and potentially the final plan.

Section 208 of P.L. 92-500 mandates that a Water Quality Management Plan be prepared in this project area. We understand that this 208 plan will be finalized by June, 1979. We fell that planning for this study must be coordinated and be compatible with the recommended methodologies to be presented and adopted in that plan.

Regarding the information presented in the POS, we feel an optimum water level retention and a controlled flow release program will be necessary in order to minimize adverse impacts of the project on fish and wildlife resources.

Water level elevations must be thoroughly studied in order to choose a level which maximizes 1-2 feet depths throughout the area for waterfowl utilization. In order to accomplish water retention and limited control, a combination of dikes, berms, and water control structures would be necessary.

Water level stability during critical life stages of wildlife will be essential to maximize productivity. It is, therefore, essential that the Massachusetts Division of Fish and Wildlife have integral control over water level fluctuation as much as possible.

In order for this agency to define the proper water level requirements it will be necessary to obtain a basin map with 2-foot contour intervals and detailed flow and flood frequency analysis.

The clearing and grubbing aspect of the project plan raises much concern with this agency, and we feel that it should only be used after all other alternatives have been eliminated. If no alternative exists, we would recommend that only a minimum of clearing and grubbing be utilized and be confined to the lower section of the project area.

Judicious disposal of the spoil material would be necessary in conjunction with this project. We feel that some of this material can be utilized in creating nesting and loafing islands for waterfowl and possibly in forming some of the dikes and berms. Surplus material must be suitably contained on an upland site.

SUMMARY

In summary, the project as presented in the POS would have significant effects on fish and wildlife resources. Modified to incorporate appropriate alternatives, planning and mitigation measures, the project could enhance management opportunities for certain fish and wildlife resources. These mitigation measures will be detailed in our final report. It is essential, however, that all alternatives be fully explored and presented as required by the Water Resource Council's, Principles and Standards. These alternatives should be addressed before stage III of the planning process is completed so that we may fully weigh their environmental impacts.

In addition, the material and information cited previously should be provided this office as soon as possible for evaluation in the final report.

Sincerely yours,

Gordon E. Beckett

Gordon E. Beckett
Supervisor

The Commonwealth of Massachusetts
Division of Fisheries and Wildlife
Leverett Saltonstall Building, Government Center
100 Cambridge Street, Boston 02202

DIRECTOR

June 8, 1979

Colonel John P. Chandler
Division Engineer
424 Trapelo Road
Corps of Engineers
Waltham, Massachusetts 02154

Dear Colonel Chandler:

This agency has had an opportunity to review and discuss the Hodges Village Dam Low Flow Augmentation Study which the Corps is conducting. It is our understanding that the projects' purpose is to provide dilution to the effluents discharged by the Webster Sewage Treatment Plant and than an augmentation pool would be created by clearing and grubbing, such pool to be filled and stored waters discharged as needed. It is supposed that, at least in some years, the augmentation pool would be drained to its bottom by fall.

From a wildlife agency perspective, the proposal does not look attractive. At least from what we now know, it does not appear that augmentation would have any significant downstream benefits and the elimination of many acres of good habitat (brusl land and timbered swamp) for the establishment of a pool would b a net loss to wildlife. Further, the drainage of said pool to an empty basin stage would not be a positive step.

It is our hope that the Corps will not proceed to develop this project as currently perceived. Our representatives have previously suggested to the Corps that consideration be given to impoundment of water for waterfowl production but we were tol that the idea would run counter to the project's purpose, flood control. Perhaps a plan can be developed that would provide rea fish and wildlife benefits without diminishing augmentation effo if they are shown to be necessary. To this end, our staff would be pleased to work cooperatively with the Corps. Please let us know if we can be helpful.

Very truly yours

Matthew B. Connolly, Jr.

Matthew B. Connolly, Jr.
Director

MBC:PSM/cms
cc: William C. Ashe, USFWS
Carl Prescott, District Manager

mr Free...

Mr. Freeman/mm/139

NEDPL-I

1

Director
Office of Federal Register
National Archives and Records Service, GSA
Washington, DC 20408

Dear Sir:

Inclosed is a Notice of Intent to be placed in the Federal Register notifying the public of the intent to prepare a Draft Environmental Impact Statement for the study to determine the feasibility of modifying Hodges Village Dam and Reservoir, Oxford, Massachusetts.

Sincerely,

Incl
As stated

CARL B. SCIPLE
Colonel, Corps of Engineers
Division Engineer

cc: Mr. Freeman
Planning Div File
Reading File

DEPARTMENT OF THE ARMY

NOTICE OF INTENT

To prepare a Draft Environmental Impact Statement (DEIS) for the study to determine the feasibility of modifying Hodges Village Dam and Reservoir, Oxford, Massachusetts.

AGENCY: U.S. Army Corps of Engineers, DOD
New England Division

ACTION: Notice of Intent to prepare a Draft Environmental Impact Statement

SUMMARY: 1. The proposed action is a plan to provide improved water quality in a portion of the French River in Massachusetts and Connecticut. During the course of the study, other water resource needs have also been investigated, including flood control, recreation, and fish and wildlife management.

2. The alternatives being considered include:

a. Improving water quality in the French River downstream of the towns of Webster and Dudley, Massachusetts by providing water storage at Hodges Village Dam for low flow augmentation releases in conjunction with advanced wastewater treatment at the Webster treatment plant. Water storage would be provided by the creation of a 200 acre seasonal impoundment.

b. Take no action.

3. a. Close coordination with key resource agencies and local interests is underway to determine the problems and needs to be addressed and to identify the significant issues

related to each alternative being considered. Additional coordination with other agencies will be made as issues and alternatives are more clearly defined. Affected Federal, State and local agencies and other interested organizations and parties will continue to be encouraged to participate in the identification of issues, problems and needs and the formulation of alternative courses of action by communicating with the addressee listed below.

b. Significant issues to be analyzed in depth in the DEIS include river basin water quality improvement needs, fish and wildlife habitat requisites, potential impacts on existing recreation usage, and reservoir vegetation clearing impacts.

c. Consultation with the Massachusetts State Historic Preservation Officer, and the U.S. Department of Interior will be initiated in accordance with the National Historic Preservation Act of 1966 and Executive Order 11593. Planning is being coordinated with the U.S. Fish and Wildlife Service on an informal and formal basis, including the procedures required by the Fish and Wildlife Coordination Act of 1958 and the Endangered Species Act Amendments of 1978.

4. A scoping meeting will be held. The date and location will be identified through Public Notice procedures.

5. The DEIS is scheduled to be completed and available for review in August 1983.

ADDRESS: Information concerning the proposed action and DEIS can be obtained by contacting: Charles B. Freeman, Impact Analysis Branch, New England Division, U.S. Army Corps of Engineers, 424 Trapelo Road, Waltham, Massachusetts 02254, ATTN: NEDPL-I, Phone (617) 647-8139, (FTS 839-7139).

DATE

CARL B. SCIPLE
Colonel, Corps of Engineers
Division Engineer

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF
NEDPL-P

6 October 1978

Mr. Gordon E. Beckett, Supervisor
Ecological Services
Fish & Wildlife Service
Post Office Box 1518
Concord, NH 03301

Dear Mr. Beckett:

We are responding to your planning aid letter dated 10 April 1978 regarding the Corps' Hodges Village Low Flow Augmentation Study. We have delayed our response in order to incorporate the results of water quality tests recently conducted for the existing reservoir. Now that the tests have been completed and analyzed, it is appropriate for us to address some of the comments and answer the questions presented in your planning aid letter.

In your description of the Hodges Village Project plan you refer the project benefits or annual savings in wastewater treatment cost of $172,000. This figure is currently being revised and will probably be adjusted to a higher amount by the Environmental Protection Agency, (EPA). Regarding the proposed pool elevations and inundation areas, it is important to note that the 22 cubic feet per second (cfs) plan would result in inundation of a maximum of approximately 200 acres at elevation 475.6 feet above msl. The 36 cfs plan would result in inundation of a maximum of approximately 427 acres at elevation 484.5 feet above msl.

The dams and sludge deposits downstream of Hodges Village Dam are currently under study by the EPA, Massachusetts Division of Water Pollution Control, and Connecticut Department of Environmental Protection. The study as proposed will include streambed sediment sampling from behind six downstream dams. Recommendations regarding the removal of the dams and sludge deposits would be made by the EPA and state agencies after the analysis is complete.

In addition to proposed clearing and grubbing, parts of the bottom within the reservoir would have to be stripped of all organic soil in order to maintain good water quality within the reservoir. With regard to the advanced wastewater treatment plants at Webster and Dudley and other water quality items for the French River, we have been informed that the final 208 report should be available shortly.

In the comments under the Fisheries Section heading, concerning fishing potential in the recreation pool, it must be stated there is no designated recreation pool proposed for the project.

An alternative suggested in your letter concerned the use of a series of dikes or berms to lagoon or impound the water to create a tertiary treatment impoundment. This would complicate the operation of the dam for its flood control purpose. Once the proposed upstream waste-water treatment plant upgrading or diversion comes into operation the flow into the reservoir would be only high quality and not require additional treatment by ponding. Also a series of small impoundments would require the flooding of more land in order to retain the same volume of water as the proposed impoundment.

Water levels and flow releases in the project would be established by the requirement of flood control and the proposed low flow augmentation for downstream water quality. The storage volume required for the 36 cfs outflow has little flexibility. Maximum and minimum pool stages are set in a rule curve and they cannot be exceeded without interfering with the requirements of either flood control or low flow augmentation. The 22 cfs operation would have more flexibility. Investigating your suggestion of maximizing one to two foot water levels we find that there is an area west of the abandoned railroad tracks and just upstream of the dam which is already partially diked off by the railroad embankment. It may be possible to install a control structure in the culverts draining this area so that one to two feet of water could be maintained there. This would require drawing down the main pool a correspondingly greater amount so that the total volume of water behind the dam would agree with the operating rule curve. Water quality studies recently completed revealed that this area may not have to be stripped of soil, thus making this proposal more feasible for waterfowl habitat. We are aware that water level stability during critical life stages is essential to maximize wildlife productivity. However, the operation of this control structure would have to be maintained by the Corps for the authorized purpose of flood control and proposed low flow augmentation. Whichever alternative pool is proposed, every effort would be made to operate the dam in a way to minimize the impacts on the waterfowl.

There are no plans at the present time to do any mapping in the project area. It would be highly unlikely that topography with 2 foot contour intervals as you requested would be performed for this type of study. We do have on file, aerial topography with a scale of 1"=200 ft., a contour interval of 5 feet, dated 1956 which was mapped prior to the dam construction.

Relating to your concern for the clearing and grubbing feature of the proposed plan, there is evidence in the technical literature that the water quality in warm water reservoirs will be very poor unless the bottom of the reservoir is cleared of vegetation. Thermal simulation studies performed by the Corps of Engineers have shown that the proposed Hodges Village impoundment would be warm and unstratified or weakly stratified during the summer. A matter of more concern is the need of stripping the reservoir bottom. Experimental soil-water contact columns were set up using soil samples taken from the bottom of the proposed impoundment area. Based on the results of these tests, certain sections of the proposed inundation area have been designated for stripping of the top soil as well as clearing. The results of these experiments showed that contact with the soils in certain sections of the reservoir would cause serious degradation of the water quality. Without the stripping, adverse water quality effects could be expected which include a lowering of the dissolved oxygen content, an increase in color, and most importantly, an increase in dissolved nutrient levels. These increased nutrient levels combined with the long hydraulic detention times and the warm water unstratified condition of the impoundment could lead to the occurrence of massive algae blooms. The creation of these blooms would cause nuisance conditions in the impoundment and would cause the release of a low quality water to the French River, which would negate the basic purpose of the low flow augmentation.

Stripping would be confined to only those areas within the proposed pool which have demonstrated a need for doing so. Spoil material removed from the site would be dealt with in a responsible manner.

NEDPL-P
Mr. Gordon E. Beckett

6 October 1978
Abreu/557/boq

Our current plans indicate that stage 2 plan formulation should be completed by December 1978 and the final feasibility report should be submitted to higher authority by the end of Fiscal Year 1979.

We hope that this information will be beneficial to you in determining the effects this project will have on the fish and wildlife of the area. We will investigate the feasibility of incorporating the modifications and alternatives into the project plan and coordinate our findings with you as the study progresses.

Sincerely yours,

JOSEPH L. IGNAZIO
Chief, Planning Division

cf:
Mr. Ciriello
EAB (Dupee)
Eng Div - WCB (DiBuono)
Reading File
Plan Div Files

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Quality Engineering

100 Cambridge Street, Boston 02202

rec'd 9/25/79

XXXXXXXXXXXX
XXXXXXXXX

Anthony D. Cortese, Sc.D.
Commissioner

September 17, 1979

Max B. Scheider, Colonel
Corps of Engineers
Department of the Army
424 Trapelo Road
Waltham, Massachusetts 02154

Re: Low-flow augmentation Studies to improve Water quality at Webster and Dudley in The French River

Dear Colonel Scheider:

I was asked to respond to your letter of August 2, 1979 which was sent to Governor Edward King, Secretary John Bewick and my office.

I would like to thank you for keeping us informed of your ongoing low-flow augmentation studies in the French River.

Presently, my staff at the Division of Water Pollution Control (DWPC) and engineers at the USEPA are reviewing a Plan of Study (POS) for a Step 1-Facilities Planning Grant which was submitted to the agencies from the Towns of Webster and Dudley. Both DWPC and USEPA expect to complete their review shortly and the consultant, Metcalf & Eddy, Inc., as engineers for both Towns, will proceed with an estimated fourteen month long facilities planning study based on the approved POS. The consultant will evaluate numerous waste treatment management techniques in order to achieve water quality standards in the French River.

If a biological wastewater treatment scheme followed by a stream discharge is found to be cost-effective, publically accepted and environmentally sound, then low-flow-augmentation must be considered for improved water quality. In fact, Metcalf & Eddy must utilize the waste load allocation of 1,000 lbs/day of Total Oxygen Demand as an effluent limitation when developing a biological wastewater treatment-stream discharge alternative. This allocation was based on a seven day ten year low flow of 22 cfs, which assumes low flow augmentation from the enlarged Hodges Village reservoir. This allocation resulted from DWPC Studies which showed that with advanced wastewater treatment (AWT) technology and a present seven day ten year low flow of about 15.4 cfs in the French River there would continue to be problems in the stream. Thus, additional stream flow is necessary and justifiable and 22 cfs plus AWT will result in acceptable water quality in the stream as depicted in the DWPC's water quality simulation model of the French River. It is assumed that your studies can be reactivated and final planning on the reservoir enlargement initiated when and if a treatment and discharge alternative is approved.

We expect close cooperation between all parties concerned with this facilities planning, e.g., Towns of Webster and Dudley, Metcalf & Eddy, Corps of Engineers, the New England Interstate Water Pollution Control Commission, USEPA, the Massachusetts Division of Water Pollution Control and the Connecticut Department of Environmental Protection. It is noteworthy that Dudley and Webster have joined together for this facilities planning and this union is almost certain to produce a long awaited solution to the unbearable odors being released from the French River and its numerous impoundments.

During facilities planning, we will look forward to working with you and your staff on the proposed Hodges Village Dam and Reservoir enlargement because of the tremendous environmental benefits it will produce.

Thank you for keeping us informed of your studies and we are looking forward to working with you on this vital interstate project in the French River Basin.

Very truly yours,

Thomas F. McLoughlin

Anthony D. Cortese, Sc.D.
Acting Commissioner

ADC/RMC/rew

cc: The Honorable Edward J. King, Governor, State House, Boston
John A. Bewick, Secretary of Environmental Affairs, Executive Office of Environmental Affairs, 100 Cambridge Street, Boston 02202
William R. Adams, Regional Administrator, U.S. Environmental Protection Agency, Region 1, John F. Kennedy Building, Boston 02203
Thomas C. McMahon, Director, Division of Water Pollution Control, 110 Tremont Street, Boston 02108
John B. Casazza, Deputy Director, Division of Water Pollution Control, 110 Tremont Street, Boston 02108
Alan Cooperman, Associate Sanitary Engineer, Water Quality Section, Division of Water Pollution Control, P.O. Box 545, Westboro 01581
Mr. Alfred Peloquin, New England Interstate Water Pollution Control Commission, 607 Boylston Street, Boston

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

October 22, 1981

Colonel C.E. Edgar, III
Division Engineer, New England
Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Dear Colonel Edgar:

As part of a combined Federal/State effort to restore fishable, swimmable water quality in the French River in Massachusetts and Connecticut, our Agency has been working with your office regarding low flow augmentation from Hodge's Village Reservoir in Oxford, MA. Currently, water quality standards are not met in the French River due to municipal and industrial wastewater discharges compounded by years of sediment buildup in several impoundments in Massachusetts and Connecticut. The high cost of attaining standards solely through treatment of Webster's and Dudley's discharges has led the Towns, the States, and EPA to search for less costly, alternative solutions. To this end, the Towns have hired a consultant to investigate all possible treatment alternatives while Massachusetts and Connecticut are examining ways of dealing with the instream sludge deposits. At the same time, your staff initiated a feasibility study of providing low flow augmentation from the existing Corps of Engineers reservoir.

Prior to this point, the New England Division office has proceeded as far as possible with the Hodge's Village low flow augmentation feasibility study pending endorsement of the project by EPA as being necessary for water quality purposes. Based on information recently received from the engineering consultants to Webster and Dudley, we can now endorse low flow augmentation for the French River. The towns' consultant has informed us that land application of the treated wastewater is not feasible meaning there will be continued discharges to the French River necessitating several actions if water quality goals are to be secured. Low flow augmentation, in addition to advanced treatment at the discharge and downstream sediment removal or inactivation, will all be necessary to insure acceptable water quality in the future.

We hereby request that your office take the necessary steps to continue and complete the low flow augmentation feasibility study for Hodge's Village.

We are currently preparing a cost analysis for wastewater treatment with and without augmentation. As soon as these figures are available, we will forward them to you for use in the benefit/cost analysis. If you have any questions, please feel free to contact me or Eric Hall of my staff. We look forward to working with you towards the successful completion of this project.

Sincerely yours,

Richard V. Toll Acting

Charles W. Murray, Jr., ~~Director~~
Water Division

cc: Thomas McMahon, DWPC
Robert Moore, CT DEP
Peter Jackson, COE
Thomas K. Walsh, Metcalf & Eddy
Gregory Barnes, Marullo & Barnes

HEIDEBRECHT/lc/547

JAN 15 1982

NEDPL-PF

Mr. Dennis Power
Oxford Town Manager
Oxford Town Hall
Oxford, Massachusetts 01540

Dear Mr. Power:

This is to inform you that our study of the feasibility of providing low-flow augmentation at Hodges Village Dam to improve the water quality of the French River in Massachusetts and Connecticut has been resumed. This study was originally deferred in August 1979, as reported to your office by letter dated 2 August 1979, and has been resumed by request of the United States Environmental Protection Agency (EPA).

Prior to deferral, the Corps had proceeded as far as possible but postponed the study pending indorsement of low-flow augmentation by the EPA as being necessary for water quality purposes. Based on information provided by the engineering consultants that are evaluating wastewater problems in Webster and Dudley, the EPA has now endorsed low-flow augmentation as being a necessary measure to insure acceptable water quality for the French River.

The proposed plan of improvement would consist of providing seasonal water storage in the Corps' existing Hodges Village Reservoir in Oxford and controlling releases during low-flow and dry periods of the year. Modifications to Hodges Village Dam and Reservoir would consist of clearing woody vegetation, selective stripping of organic topsoil in the reservoir area to be inundated, and modifying the outlet gates of the dam. All proposed work would take place in areas owned and maintained by the Corps of Engineers. The plan would provide storage of high quality water to assure adequate flow downstream of the dam throughout the year.

JAN 1 5 1982

NEDPL-PF
Mr. Dennis Power

At the point of deferral in 1979, the total estimated first cost of the proposed modifications were estimated at approximately $2 million. At that time the results of our investigation indicated that seasonal storage to provide low-flow augmentation for water quality improvement was both technically and economically feasible. Project costs and benefits are currently being updated by this office. The next step will be to evaluate the beneficial and adverse effects of the plan.

Members of my staff will be in contact with you in the near future to arrange for a meeting to discuss the future direction of the study. Should you have any questions, please contact Mr. Richard Heidebrecht, who is coordinating the study. He may be reached at (617) 894-2400, extension 547.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

cc:
Mr. Jackson
Reading File
Plan Div Files

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J. F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

March 4, 1982

Mr. Joseph L. Ignazio, Chief
Planning Division
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Dear Mr. Ignazio: Joe

As requested by the Corps of Engineers, we have calculated water quality benefits attributable to the Hodges Village low flow augmentation project. If a continuous flow of 22 cfs is maintained at the USGS gage in Webster, the projected annual savings in wastewater treatment cost is approximately $930,000. This is based on May, 1981, costs (ENR Index = 3470) and a discount rate of 7 5/8%. Calculations for these costs are shown on the attached worksheet.

As you are aware through your active participation on the Working Group on Interstate Transport of Pollutants, the provision of low flow augmentation and Advanced Treatment alone will not meet the water quality standards on the French River. Oxygen demanding sludge deposits in the five impoundments between Webster and the confluence with the Quinebaug River must be removed or somehow inactivated to allow for full recovery of the French River. However, the combination of Advanced Treatment and low flow augmentation will result in a significant improvement in water quality. Based on the water quality and cost analyses, we believe that low flow augmentation is an environmentally and economically sound proposal.

Sincerely yours,

Richard P. Kotelly, Acting Director
Water Division

attachment

cc: Russell A. Isaac, MDWPC
Robert Smith, CT DEP
Alfred Peloquin, NEIWPCC

ASSUMPTIONS

- Treatment systems - Information from preliminary engineering estimates (attached) developed by Metcalf & Eddy, consultants to Webster/Dudley.

- Preferred alternative with LFA is a modification of Alternative #1, Table 4. The unit process for filtration is eliminated (not necessary for $BOD_5 \geq 10$ mg/L) and the capital cost for phosphorus removal is reduced from $800K to $100K (Tables 5 and 6, M&E).

- For comparison, the alternative without LFA is a modification of Alternative 2, Table 4. The capital cost remains the same, but the O&M cost is increased by 20% to account for additional power and labor to reduce the ammonia concentration from 2 mg/L (basis of Table 4 estimates) to 1 mg/L. The more flexible, more expensive phosphorus removal system is included.

- Effluent characteristics from water quality modeling conducted by Massachusetts DWPC and EPA. This information has previously been submitted to the Corps of Engineers.

- Costs are Based on an ENR Index of 3470, May, 1981.

COMPARISON OF EFFLUENT LIMITS AND TREATMENT COSTS WITH AND WITHOUT LOW FLOW AUGMENTATION

	Without Low Flow Augmentation	With Low Flow Augmentation
Webster/Dudley Wastewater Flow, mgd (cfs)	6(9)	6(9)
Webster gage flow at 7-Q-10, cfs	11	22
Webster characteristics, mg/L		
BOD_5	5	10
NH_3	1	2
P	1	1
D.O.	6	6
Costs ($\times 10^6$)		
Capital cost, Present Worth	$13.0	$ 7.2
O&M cost, Present Worth	14.6	10.3
Total Present Worth	27.6	17.5
Total Annual Cost @ 7 5/8% for 20 years	2.54	1.61

Difference in Annual Cost $930,000

Summary of Treatment Alternatives

Available portions of the draft Metcalf & Eddy report, with preliminary cost estimates, are attached discussing the following alternatives. All alternatives are based on 22 cfs at the Webster gage.

Alternative 1 - Single-stage nitrification facility located in Webster to treat raw wastewater from Webster and Dudley. Costs presented on Table 3, Alternative 1.

Alternatiave 1A - Single-stage nitrification facility in Webster to treat Webster's raw wastewater and effluent from roughing plant in Dudley. Costs presented on Table 4, Alternative 1 (preferred alternative).

Alternative 2 - Two-stage nitrification facility located in Webster to treat raw wastewater from Webster and Dudley. Costs presented on Table 3, Alternative 3.

Alternative 2A - Two-stage nitrification facility in Webster to treat Webster's raw wastewater and effluent from roughing plant in Dudley. Costs presented on Table 4, Alternative 2.

Alternative 3 - A lime primary, nitrification plant in Webster to treat raw wastewater from Webster and Dudley. Costs presented on Table 3, Alternative 3.

Alternative 3A - A lime primary, nitrification plant in Webster to treat Webster's raw wastewater and effluent from a roughing plant in Dudley. Cost presented on Table 4, Alternative 3.

Alternative 4 - Land application of secondary effluent from Webster and Dudley. No costs shown since technical considerations ruled out this Alternative. See attached discussion.

TREATMENT AND DISPOSAL ALTERNATIVES

Federal regulations require that reuse, land treatment, and treatment and discharge alternatives be considered as part of facilities planning. We have determined that no reuse or land treatment opportunities exist within the Towns of Webster and Dudley. For this reason, our studies will focus on finding a method of treating the wastewaters of the Towns so that they may be discharged to the French River.

In completing the studies to date, all potential treatment and discharge options have been reviewed in light of the capabilities of existing facilities. Due to the considerable investment which the Towns have made in their existing wastewater treatment plants, our studies have been aimed at determining treatment methods which will make maximum use of these plants.

Regional Options

As a first step in our investigation, we have reviewed various regional options, considering whether the Towns should continue to separately treat their wastes, or should treat them jointly. The options considered include:

1. Provision of AWT at separate treatment plants located in Webster and in Dudley.
2. Provision of secondary treatment of Dudley wastewater at its existing treatment plant, followed by AWT at the Webster treatment plant.

TABLE 1

SUMMARY OF RAW WASTEWATER CHARACTERISTICS

	WEBSTER AND DUDLEY	
	EXISTING	FUTURE
SERVICED POPULATION	14,122	21,330
FLOW, (MGD)		
AVERAGE DAILY	4.74	6.08
PEAK	12.76	12.65
BOD, (LB/DAY)		
AVERAGE INDUSTRIAL	5,830	10,330
AVERAGE DAILY	8,220	14,740
SUSPENDED SOLIDS, (LB/DAY)		
AVERAGE INDUSTRIAL	3,700	3,695
AVERAGE DAILY	6,705	8,210
TOTAL KJELDAHL NITROGEN, (LB/DAY)		
AVERAGE DAILY	1,015	1,300
TOTAL PHOSPHORUS (LB/DAY)		
AVERAGE DAILY	255	340

TABLE 2

Parameter	Secondary treatment	Current standards	Revised standards
Flow (mgd)	6.33	7.03	6.0±
BOD_5 (mg/L)	25 Aug., Sept 30 June, July, Oct. 40 Nov. - May	7	10
Suspended solids (mg/L)	30	8	12 - 15
Settleable solids (weekly avg. in ml/L)	0.1	0.1	-
Ammonia (mg/L)	-	1.7 April 1 - Oct. 15	2.0 April 1 - Oct. 15
Phosphorus (mg/L)	-	1.0 April 1 - Oct. 15	*
Dissolved Oxygen (mg/L)	6.0	6.0	6.0

*Equipment will be installed and river studies will be performed to decide whether or not to operate phosphorus removal equipment.

3. Provision of something less than secondary treatment (roughing) of Dudley wastewater at it's existing plant, followed by AWT at the Webster treatment plant.
4. Provision of all treatment at an AWT facility in Webster.

Provision of a single AWT plant in Dudley to handle the wastes at both Towns was not considered due to the large existing facility in Webster.

An evaluation of the costs related to these options is presented in Table 2. Based on the results of this comparison, it is recommended that only the last two possibilities be further evaluated. As can be seen in the Table, the present worth cost for options one and two are estimated to be 25 and 15 percent higher, respectively than that for options three and four. The preliminary costs for options three and four are essentially equal and both will be evaluated in further detail.

TABLE 2. COST SUMMARY FOR REGIONAL TREATMENT OPTIONS

TREATMENT OPTION	ALL COSTS IN MILLION DOLLARS		
	CAPITAL COST	ANNUAL O&M COST	TOTAL PRESENT WORTH
1. AWT AT SEPARATE TREATMENT PLANTS	11.7	1.4	26.2
2. SECONDARY TREATMENT AT DUDLEY FOLLOWED BY AWT AT WEBSTER (SLUDGE HANDLING AT WEBSTER)	10.7	1.3	24.2
3. LESS THAN SECONDARY (ROUGHING) AT DUDLEY FOLLOWED BY AWT AT WEBSTER	9.1	1.2	21.3
4. ALL TREATMENT AT AWT FACILITY IN WEBSTER	7.6	1.3	20.7

TABLE 3. SUMMARY OF COSTS FOR
ALL TREATMENT AT AWT FACILITY IN WEBSTER

	Alternative 1 Single-Stage Nitrification		Alternative 2 Two-Stage Nitrification		Alternative 3 Lime Primary and Nitrification	
Capital Costs (million dollars)						
Liquid treatment						
General	3.4		6.5		4.3	
Filter	1.6		1.6		1.6	
Solids handling	2.0		2.6		1.9	
Laboratory, shop and garage	0.3		0.3		0.3	
General rehabilitation	0.3		0.5		0.4	
Total capital cost	7.6		11.6		8.5	
O&M Cost (million dollars)						
Total annual O&M cost	1.3		1.3		1.1	
Present worth of capital costs	8.0		12.2		8.9	
Present worth of O&M costs	12.7		13.1		10.7	
Total present worth	20.7		25.3		19.6	
Current/Anticipated Costs ($)	Industries	Residents	Industries	Residents	Industries	Residents
Added annual debt service	423,000	39,000	645,000	60,000	470,000	60,000
Approximate current annual debt service	76,000	70,000	76,000	70,000	76,000	70,000
Total annual debt service	499,000	109,000	721,000	130,000	546,000	130,000
Annual O&M	906,000	387,000	935,000	399,000	764,000	326,000
Total annual cost	1,405,000	$91/house	1,656,000	$97/house	1,310,000	$84/house

TABLE 4. SUMMARY OF COSTS FOR
ROUGHING AT DUDLEY FOLLOWED BY AWT AT WEBSTER

	Alternative 1 Single-Stage Nitrification		Alternative 2 Two-Stage Nitrification		Alternative 3 Lime Primary and Nitrification	
Capital Costs (million dollars)						
Liquid treatment						
General	4.9		8.0		5.8	
Filter	1.6		1.6		1.6	
Solids handling	2.0		2.6		1.7	
Laboratory, shop and garage	0.3		0.3		0.3	
General rehabilitation	0.3		0.5		0.4	
Total capital cost	9.1		13.0		9.8	
O&M Cost (million dollars)						
Total annual O&M cost	1.2		1.2		1.0	
Present worth of capital costs	9.5		13.7		10.4	
Present worth of O&M costs	11.8		12.2		10.0	
Total present worth	21.3		25.9		20.4	
Current/Anticipated Costs ($)	Industries	Residents	Industries	Residents	Industries	Residents
Added annual debt service	502,000	46,000	724,000	67,000	550,000	51,000
Approximate current annual debt service	76,000	70,000	76,000	70,000	76,000	70,000
Total annual debt service	578,000	116,000	800,000	137,000	626,000	121,000
Annual O&M	842,000	360,000	871,000	372,000	714,000	305,000
Total annual cost	1,420,000	$87/house	1,671,000	$93/house	1,340,000	$77/house

+20%

TABLE 5

COST BREAKDOWN (PRESENT WORTH)

	Roughing at Dudley followed by AWT at Webster	All treatment at AWT facility in Webster
Capital Cost		
Solids handling	2.0	2.0
Phosphorus	0.8	0.8
Filter	1.6	1.6
Other	5.1	3.6
Subtotal (capital cost)	9.5	8.0
O&M Cost		
Solids handling	1.7	1.7
Phosphorus	3.8	3.8
Filter	1.5	1.5
Current	4.8	4.8
Other	-	0.9
Subtotal (O&M cost)	11.8	12.7
Total present worth	21.3	20.7

TABLE 6

COST BREAKDOWN (PRESENT WORTH)

	Total	Current costs	Solids handling	Upgrading	Total Upgrading cost
Capital Cost					
Solids handling	2.0		2.0		2.0
Phosphorus	0.8			0.8	0.8
Filter	1.6				
Other	5.1	—	—	5.1	5.1
Subtotal (capital cost)	9.5	0	2.0	5.9	7.9
O&M Cost					
Solids handling	1.7		1.7		1.7
Phosphorus	3.8				
Filter	1.5				
Current	4.8	4.8			4.8
Other	–	–	–	–	–
Subtotal (O&M cost)	11.8	4.8	1.7	0	6.5
Total present worth	21.3	4.8	3.7	5.9	14.4
			O&M for Phos.	3.8	3.8
			Revised Total	9.7	18.2

METCALF & EDDY

ENGINEERS

INTER-OFFICE CORRESPONDENCE

File: J-6881

TO: Joseph D'Alesio | DATE: April 21, 1981

FROM: Warren Diesl | OFFICE: Boston

SUBJECT: Potential Land Application Sites 2B and 2E in Dudley, MA | COMPANY: Inc.

On April 15, 1981, a brief reconnaissance of two potential land application sites in Dudley, Massachusetts was conducted. The following comments are based on that reconnaissance and on published soils information. Surficial geologic or water resources maps are not available for the site.

Site 2B

Site 2B is located on the drainage divide between the French River and the Quinebaug River. The site consists of a low hill with slopes that vary from fairly level to about 10 percent. It is underlain by bouldery glacial till, and bedrock outcrops were observed at several locations across the site.

According to the most recent soil survey of the area (Soil Survey of Worcester County, 1927), the soil type at the site is Gloucester stony fine sandy loam. This soil type typically develops on glacial till that is 1 to 20 feet thick and derived from granitic rocks.

Site 2B is not recommended as a rapid infiltration site. The typical soil profile for Gloucester fine sandy loam includes a relatively impermeable layer at a depth of several feet, according to descriptions from soil reports for other parts of Massachusetts. The soil is too impermeable and too thin to provide adequate drainage for a rapid infiltration system. Basin construction and underdrain installation would be extremely difficult due to shallow bedrock, numerous boulders, and slopes.

Site 2E

Site 2E consists generally of a valley with a small stream draining through it. The stream flows into Packard Pond which in turn drains into the French River.

The section of the site west of the railroad tracks is underlain by bouldery glacial till and is similar to site 2B. Few outcrops were observed in this area, however, indicating that the till maybe somewhat thicker and therefore the bedrock somewhat deeper.

The portion of the site that borders the stream is a mucky area with the water table at or near the surface. Bedrock is probably fairly shallow in this area, also.

A small area of stratified drift deposits occurs as an oval shaped terrace on the flank of the valley wall east of the stream. Some sand and gravel has been removed from the deposit. Merrimac soils have developed on these deposits, according to the soil report. These soils would probably be permeable enough to be suitable for rapid infiltration. However, the area is too small. Wastewater applied to these deposits would flow into the stream in the valley, probably emerging as seepage at the base of the terrace.

The eastern part of site 2E is a hillside, again underlain by bouldery glacial till. Site 2E is not recommended as a rapid infiltration site because it contains only a small area of suitable soils. It is mostly underlain by soils that are unsuitable for reasons stated in the description of site 2B.

Warren Diesl

Warren F. Diesl
Hydrogeologist

WD:rak

(J. P. Alowr) 71-11 / 11-3-

SCREENING OF LAND TREATMENT ALTERNATIVES

Introduction

In screening treatment alternatives for the Towns of Webster and Dudley, it has been necessary to assume that the design average flows for the Towns will be as indicated in the Dudley-Webster Facilities Plan prepared by Hoyle, Tanner & Associates, Inc. in December 1977. These flows, in million gallons per day (mgd), are as follows:

Webster	6.2 mgd
Dudley	1.4 mgd
Webster/Dudley	7.6 mgd

Although the above flows will be verified and/or adjusted as part of this facilities plan, they are believed to be within the limits of accuracy required for preliminary screening of alternatives.

After a preliminary inspection and review of the existing wastewater treatment facilities in the Towns, it is believed that each plant can be improved sufficiently to achieve secondary treatment levels with relatively little additional capital cost. Many of the needed improvements to these plants are currently in progress. Since both plants are fairly new, it is believed that they should not be abandoned.

The current discharge permits for the Towns indicate high levels of BOD and solids removal will be required on a year-round basis. Additionally, nitrification and phosphorus removal will be necessary between April 1 and October 15 of each year.

With the above points in mind, our approach to the screening of land treatment alternatives has been on the basis of the following criteria:

1. Land treatment systems will receive secondary effluent.
2. Land treatment systems which involve discharge of treated effluent must provide high levels of BOD and solids removal on a year-round basis and provide nitrification and phosphorus removal during summer operation (April 1 through October 15).
3. Design average wastewater flows will be as indicated above.
4. Land treatment systems must be located within the Towns of Webster and Dudley.

Environmental Considerations

Land treatment systems are more sensitive to the natural environment than conventional systems. Considerations such as climate, topography, soils, geology, and groundwater location and movement play a significant role in the selection and design of land treatment systems. In screening treatment alternatives, the major elements of concern are climate, topography, and soils. Other considerations would be investigated only if land treatment were considered feasible.

Climate. The major climatic factor involved in the screening of land treatment alternatives in New England is temperature. Other climatic considerations such as precipitation and evaporation play a major role in the final selection and design of these systems.

Both Towns experience relatively warm summers and cool winters. Their mean annual temperature is approximately 47 deg F, and average daily temperature varies between 10 and 80 deg F. The average annual precipitation is approximately 42 to 45 inches and is well distributed throughout the year.

Topography. The topography of the Towns is primarily hilly but varies throughout the area. There is a series of hills on the east side of Webster Lake, the highest elevations being 850 to 900 feet. Smaller hills are located on both sides of the French River, at approximately 500 to 600-foot elevations. Approximate low elevations in the Towns range from 400 feet at the sewage treatment plants to 480 feet at Webster Lake and 485 feet at Merino Pond in Dudley.

Average slopes in Dudley range from 5 to 8 percent in the north, relatively flat to 11 percent in the south, 4 to 5 percent in the east (downtown), and 8 to 23 percent in the west.

Average slopes in Webster range from 8 to 21 percent in the northeast, 8 to 10 percent in the southeast, relatively flat to 11 percent in the southwest, and relatively flat to 3 percent in the northwest. These relatively flat areas in Webster are swampy. A lake, two rivers and many small ponds and swamps make up the surface water hydrology of the area.

Webster has a large lake located in the middle of the Town which extends south toward the Connecticut border. Webster Lake comprises approximately 13 percent of the total land area of

Webster. Nipmuck Pond is a small pond in the northeast part of the Town. A large swampy area is located west of Webster Lake and north of the Connecticut border.

Dudley has 15 small ponds which are mainly scattered throughout the eastern and northeastern part of the Town. Together, these ponds comprise approximately 5 percent of the land area of Dudley. Small swamps are also scattered throughout Dudley, many near several of the ponds.

The two major watercourses in the area are the French River and the Quinebaug River. The French River forms the boundary line between the Towns of Webster and Dudley, and the Quinebaug River flows through the southwest section of Dudley.

Soils. The characteristics of the most frequent soil series in the Towns of Webster and Dudley are discussed below:

Merrimac series soils consist of gravelly loam and gravelly sandy loam up to depths of 40 inches. The substratum consists of beds of assorted sand and gravel from 20 to 50 feet thick.

Merrimac soils occur on terraces and fairly level surfaces. Drainage is excellent primarily due to the gravel in the substratum. Soil permeability is moderately rapid to rapid.

Land treatment methods which are applicable to Merrimac soils are rapid infiltration and slow rate. There is no Merrimac soil in Dudley and this soil occurs only in the developed areas of Webster.

Gloucester series soils consist of loam, fine sandy loam and stony fine sand loam up to depths of 24 to 30 inches. Below this depth is unweathered till of a fine sandy loam texture. The substratum below the till consists of bedrock.

The topography of Gloucester soils varies from undulating to rolling or hilly. Drainage is well established but seepage sometimes occurs along hillsides. Soil permeability is classified as rapid.

Gloucester soils exhibit a moderate potential for rapid infiltration and can be found in both Webster and Dudley.

Hinckley series soils consist of gravelly sandy loam and stony loam to depths of 24 to 30 inches. The substratum consists of gravel and coarse sand with occasional rounded boulders. The topography of Hinckley soils is rough or knolly. Drainage is considered excessive and is entirely internal. Soil permeability is classified as rapid to very rapid.

Hinckley soils have a high potential for rapid infiltration. These soils exist in both Towns and are generally found near bodies of water such as Webster Lake, the French and Quinebaug Rivers, and several of the small ponds in Dudley as well as near low lying mucky areas.

Charlton series soils consist of loam, stony loam and fine sandy loam to depths of 24 inches. Below this is partially weathered till of similar texture to the soil above it. This till extends to bedrock. Topography varies from low hills for fine sandy loam, to sloping or hilly for loam, to steeply sloping with outcrops and ledges for stony loam. Drainage is generally good and the soil has a strong moisture holding capacity. Soil permeability ranges from moderate to moderately rapid.

Charlton soils have a moderate potential for slow rate land treatment. These soils can be found in the western half of Dudley, approximately 2 to 5 miles west of the French River. There are no Charlton soils in Webster.

Sutton series soil and subsoil consist of a loamy material to depths of 30 inches. The topography varies from fairly level to gently sloping. Drainage is not very good as rocks prevent the downward movement of water and fairly level surfaces result in poor runoff. Soil permeability ranges from moderate to moderately rapid.

Sutton loam is utilized chiefly for agriculture and is especially well suited for dairying.

Sutton loam exists in large areas in the central portion of Dudley. This soil is considered marginally suitable for slow rate land treatment.

Rough stony land includes all lands too rough and stony to be used advantageously for farming. The soil material varies according to the soil types in the vicinity. The topography is generally rough and broken. Drainage is well established due to surface channels which are dry except in rainy weather. In areas where stony ground occurs between hills, drainage is poor.

Rough stony land is not suitable for land treatment and can be found mainly in the eastern part of Webster and the northern part of Dudley in areas of steep slopes.

Treatment Techniques

There are three basic land treatment techniques. These are:

1. Slow rate
2. Rapid infiltration
3. Overland flow.

Two additional techniques, silviculture and wetlands, involve variations of the basic treatment techniques in which wastewater is applied to forested areas or to marshy areas, respectively. The major features of these types of land treatment systems are shown in Table I.

Slow Rate Systems. In slow rate land treatment, water and nutrients are removed from wastewater to support the growth needs of plants. Applied wastewater is treated as it flows through the soil matrix, and a portion of the flow percolates to the groundwater. Surface runoff of the applied water is generally not desirable.

Slow rate systems can be adapted to a wide range of sites, including land considered marginal for agriculture. However, the major characteristics of the site, such as soil properties, topography, and hydrogeologic conditions, have very significant effects on many of the design features.

In general, most soil types from sandy loams to clay loams are suitable for slow rate systems. Low permeability clays, although acceptable in many cases, require reduced application rates to preclude waterlogging. Coarse sands and gravel, on the other hand, are often better suited for rapid infiltration.

TABLE I COMPARISON OF IMPORTANT OBJECTIVES, DESIGN FEATURES, AND SITE CHARACTERISTICS OF LAND TREATMENT METHODS

	Slow rate	Rapid infiltration	Overland flow	Silviculture
Objectives	Treatment Water reuse Crop production	Treatment Groundwater recharge	Treatment Crop production	Treatment Tree production
Typical design features				
Application techniques	Sprinkler or surface	Usually surface	Sprinkler or surface	Usually sprinkler
Weekly application rate, in.	0.5 to 4	4 to 120	2.5 to 16	0.5 to 3
Annual application rate, ft.	2 to 20	20 to 500	10 to 70	2 to 13
Field area required, acres/mgd(1)	56 to 560	2 to 56	16 to 110	86 to 560
Disposition of applied wastewater	Evapotranspiration and percolation	Percolation or underdrainage and discharge	Surface runoff and evapotranspiration with some percolation	Evapotranspiration and percolation
Need for vegetation	Usually required	Optional	Required	Required
Site characteristics				
Soil permeability	Moderately slow to moderately rapid	Rapid (sands and sandy loams)	Slow (clay and clay loams)	Moderate to rapid
Climatic restrictions	Storage often needed	Storage may be needed	Storage often needed	Storage may be needed
Slope	Less than 20% on cultivated land; less than 40% on noncultivated land	Not critical; excessive slopes require much earth	Finish slopes 2 to 8%	Same as slow rate
Depth to groundwater	2 to 3 ft (minimum)	10 ft (lesser depths are acceptable where underdrainage is provided)	Not critical	Same as slow rate

1. Field area in acres not including buffer area, roads, or ditches for 1 mgd flow.

Most of the soils found in Webster and Dudley would be suitable for use with slow rate systems.

Rolling terrain with slopes up to 20 percent can be used if runoff and erosion are controlled and proper application techniques are practiced. Surface application techniques are generally limited to relatively flat slopes.

Hydrogeologic conditions should be such that the groundwater table does not interfere with proper renovation of wastewater or plant growth. Generally, this means that the minimum depth to groundwater should be about 3 feet and preferably 5 feet during full operation. This depth may require the use of underdrains or groundwater pumping.

As shown in Table I, application rates vary from about 0.5 to 4.0 inches per week and from 2 to 20 feet per year. Factors that affect these rates include crop needs, nutrient balances, soil and groundwater conditions, and climate. Storage of 80 to 100 days flow would be required in Webster/Dundley.

Applied wastewater would receive secondary treatment at the existing Webster and Dudley facilities. If spray application is utilized, disinfection may be necessary.

Slow rate land treatment is capable of the best treatment results of all the land treatment options. For systems where percolating waters reach groundwater, the EPA Interim Primary Drinking Water Regulations must be satisfied. Systems which involve discharge of treated effluent could be designed to meet or exceed the currently proposed discharge standards for the Towns.

Including storage requirements, the land area needed for slow rate application would be 880 to 4,700 acres in order to treat the combined flow of the Towns. The land area needed to treat only Dudley's flow would be 230 to 1,140 acres.

Rapid Infiltration Systems. In rapid infiltration land treatment, most of the applied wastewater percolates vertically and laterally through the soil, and the treated effluent eventually reaches the groundwater, although application areas can be underdrained, and the treated percolate can be reused or discharged to a surface stream. The wastewater is applied to rapidly permeable soils, such as sands and sandy loams, by spreading in basins or by sprinkling, and is treated as it travels through the soil matrix. Vegetation is not usually used, but there are some exceptions. A much greater portion of the applied wastewater percolates to the groundwater than with the slow rate land treatment. There is little or no consumptive use by plants and less evaporation in proportion to surface area.

Because rapid infiltration does not rely on vegetation, it is the land treatment method most adaptable to cold climates. Also, surface application by flooding basins is less susceptible to freezing than other distribution techniques. When ice forms on the surface of flooded basins, it is not removed but merely floated by the next application of wastewater. However, precautions must be taken where frost-susceptible soils are utilized.

Highly permeable soils are required for rapid infiltration systems. Sands, sandy loams or gravels such as the

Hinckley or Merrimac series soils are the most suitable for rapid infiltration systems, but most of the other types of soils common to the Towns could also be used.

A soil profile of 10 to 15 feet is preferable to ensure adequate treatment of wastewater, but shallower depths may be utilized in some situations. The natural water table should generally be deep enough so that it does not rise to within about 6 inches of the ground surface during flooding. A minimum groundwater depth of about 5 feet is desirable during drying periods so that the soil can be quickly reaerated.

Topography has a minimal impact on the selection of rapid infiltration sites. Although flatter sites are preferable, and are the least costly to construct, steeper sites may be utilized if infiltration basins are terraced.

The primary characteristic that distinguishes rapid infiltration from slow rate treatment is the hydraulic application rate. It is generally more than 4 inches per week and may be as high as 120 inches per week. In the case of Webster and Dudley, application rates of between 2 and 30 inches per week could be utilized, depending on specific soil characteristics and the design of treatment required. In the application cycle, period of flooding are alternated with periods of drying so that the soil can be reaerated. The timing of these periods can affect the infiltration rates and the amount of treatment that takes place in the percolating wastewater.

Rapid infiltration systems are capable of nearly complete removals of BOD and suspended solids. They can also achieve phosphorus removals of 70 to 90 percent, and when properly designed and operated can achieve a high degree of nitrification. Nitrogen removals are generally poor unless specific operating procedures can be established to accomplish denitrification.

Utilizing rapid infiltration techniques, 140 to 1,200 acres of land would be needed to treat the combined Webster/Dudley flow and 50 to 330 acres would be needed for the Dudley flow only. No allowance for storage has been included in these estimates as it may not be required for rapid infiltration systems.

Overland Flow Systems. In overland flow systems, wastewater is applied over the upper reaches of sloped terraces and allowed to flow across a vegetated surface to runoff collection ditches. The wastewater is renovated by physical, chemical, and biological means as it flows in a thin film down a relatively impermeable slope. The treated water is collected at the toe of the overland flow slopes and can either be reused or can be discharged to surface water. These systems can also be used for production of forage grasses and the preservation of greenbelts or open spaces.

The most important element of an overland flow system is the sloped terrace. Wastewater treatment is highest at relatively gentle slopes (2 to 4 percent), but acceptable treatment occurs with slopes as high as 8 percent. The common length of slope is 100 to 300 feet. Surfaces must be sufficiently smooth to produce a uniform film of flowing water and to prevent both ponding and erosion.

Low permeability soils, such as clays or silts, are generally required for overland flow, although other soil types can sometimes be used as long as percolation is impeded. The soil depth should be sufficient to form slopes and maintain vegetative cover.

In Webster and Dudley, there are no soils which would be suitable for use with overland flow systems. For this reason, treatment by overland flow has not been further considered.

Application to Forestlands (Silviculture). Forests offer several advantages as potential sites for land treatment:

1. Large forested areas exist near many sources of wastewater.
2. Forest soils often exhibit better infiltration properties than agricultural soils.
3. Land values for forests are usually lower than land values for agriculture.

The principal limitations on the use of wastewater for silviculture are that:

1. Water tolerances of the existing trees in New England are low.
2. Nitrogen removals are relatively low.
3. Fixed sprinklers, which are expensive, must generally be used.
4. The use of forested areas for wastewater treatment precludes their use for recreational purposes.

Existing forests have adapted to the water supply from natural precipitation. Unless soils are well drained, the increase in hydraulic loading from wastewater application will drown existing trees.

Based on the above considerations, wastewater treatment by silviculture is not recommended for Webster/Dudley.

Wetland Treatment Systems. The application of secondary effluent to existing and artificial wetlands is presently being studied in several areas of the country. Various plants such as water hyacinths, cattails and duckweed are being used in secondary wastewater lagoons to remove BOD, suspended solids and nutrients. For effective nutrient removal, plants must be harvested.

The use of wetlands in wastewater treatment is a relatively new approach and techniques for nutrient removal, loading rates, climatic constraints and suitable site characteristics need further study. The wetlands systems which have been operated in the United States have not been found to be capable of achieving the high degree of treatment required in Webster and Dudley. Wetlands systems are not considered to be a feasible option for the Towns.

Site Availability

Figure 1 shows the location of areas in the Towns of Webster and Dudley which have soils that are potentially suitable for use in land treatment. In looking for suitable sites, two broad classes of areas were first removed from consideration. These were:

1. Currently developed areas and areas which comprise water bodies.

2. Areas having unsuitable soils for land treatment. These broad areas and the major soil types in other areas of the Towns are shown on the figure.

The general relief of the areas of the Towns containing suitable soils was next investigated. Much of this land is either too rough and hilly, or is too marshy for use as a land treatment site. No potential sites could be found in the Town of Webster.

The Town of Dudley contains two broad areas which could be used for land treatment systems, as shown in Figure 1.

Site 1. Site 1 consists of approximately 340 acres of open land in the vicinity of Bates Hill. The site has a high potential for residential development. It contains the Regional High School, a golf course, a water storage tank for the Town of Dudley, and is is abutted by residential developments. For these reasons, we do not recommend further consideration of this site.

Site 2. Site 2 consists of approximately 865 acres of open land. It is located in the vicinity of the Holy Trinity Cemetery. The site primarily contains Gloucester series soils, plus some areas of Sutton and Hinckley series soils. It is relatively flat in relief, having a gently rolling topography. However, large portions of the site are either too steep or too marshy for use.

A more detailed map of this site is shown in Figure 2. As shown on the figure, five subareas, numbered 2A through 2E, have been identified as potentially suitable.

LEGEND

CURRENTLY DEVELOPED LAND & WATER BODIES

UNSUITABLE SOILS

HIGH POTENCIAL FOR LAND TREATMENT

H HINCKLEY SERIES SOILS

M. MERRIMAC SERIES SOILS

MODERATE POTENCIAL FOR LAND TREATMENT

G GLOUCESTER SERIES SOILS

LOW POTENCIAL FOR LAND TREATMENT

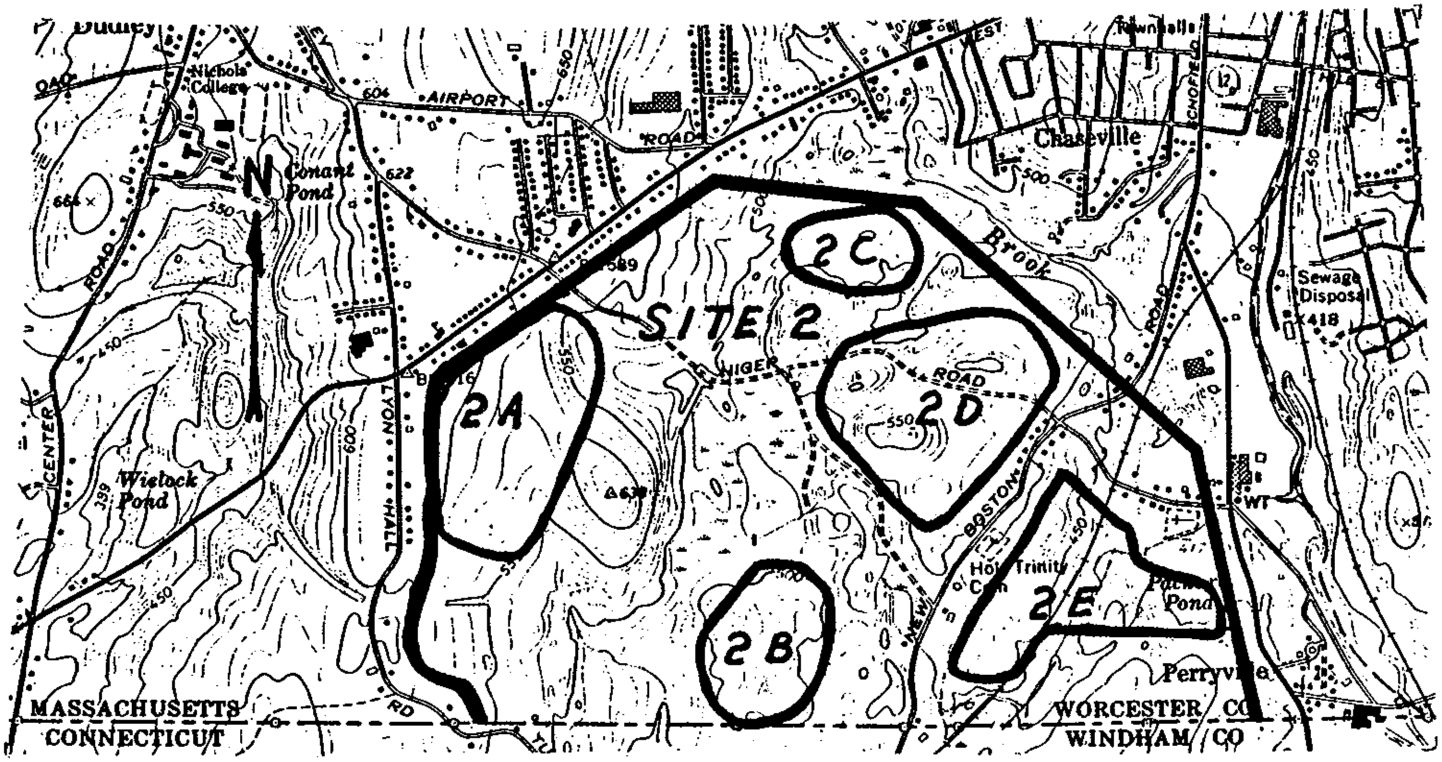
C CHARLTON SERIES SOILS

S SUTTON SERIES SOILS

B BROOKFIELD SERIES SOILS

FIGURE 1

LOCATION OF SOILS SUITABLE FOR LAND TREATMENT



SCALE 1" = 2,000'

FIGURE 2
LAND TREATMENT SITE 2

Site 2A contains approximately 75 acres of Gloucester and Sutton series soils. It is reported to have a high groundwater table; it has been subdivided; and a portion of the site is a landfill. Its potential for use is low.

Site 2B contains approximately 40 acres of Gloucester series soils. The site is undeveloped, relatively flat and is fairly secluded. Of the five subareas of Site 2, it has the highest potential for use.

Site 2C contains approximately 20 acres of primarily Hinckley series soils. It is partially developed or subdivided and contains some marshy areas. The site has a low potential for use.

Site 2D contains approximately 85 acres of Gloucester series soils. There is a subdivision in the area north of Niger Road, and one house in the area south of the road. It has a moderate potential for use.

Site 2E contains approximately 65 acres of Gloucester series soils. It is bisected by the Penn Central Railroad, and parts of it are wetlands containing a stream which runs into Packard Pond. It has a moderate potential for use.

The total area of the potentially suitable subareas of Site 2 is approximately 285 acres. Of this total area, 100 to 200 acres may eventually be found acceptable for use in land treatment. Of this acceptable area, most of the soil is in the Gloucester series soils, which have a moderate potential for use in land treatment.

Possible Treatment Alternatives

In screening land treatment techniques for the Towns, two basic options were considered. These were:

1. Treatment of the total flow from both Towns.
2. Treatment of flows from Dudley only.

This approach was used because it was believed that if insufficient land were found for the combined flow, it may be possible to find enough land for treatment of Dudley flow only.

As discussed in the section of this chapter titled "Treatment Techniques", only slow rate and rapid infiltration systems are considered suitable for use in the Towns. The land area requirements for utilization of these techniques are shown in Table 2.

TABLE 2. LAND AREA REQUIREMENTS FOR LAND TREATMENT SYSTEMS(1)

Technique	Land area, acres(2) Dudley only	Webster & Dudley
Slow rate	230-1,140	880-4,700
Rapid infiltration	50-330	140-1,200

1. Based on previously discussed maximum and minimum application rates.
2. Includes areas required for buffers, storage, and interior site needs.

Slow Rate Systems. There is insufficient land for utilization of slow rate systems. In order to treat the combined flow of the Towns at least 880 acres would be needed.

We do not believe that more than 200 acres of acceptable land can be found in Site 2. The fact that the acceptable areas would be scattered throughout the site will increase buffer area requirements, bringing the minimum area needed for treatment of Dudley flows only to approximately 300 acres.

For the above reasons, slow rate systems are not considered feasible.

Rapid Infiltration. The feasibility of treating the combined flows of the Towns is considered minimal. Although it may be possible to utilize rapid infiltration for treatment of the combined flows of the Towns using as little as 140 acres, two factors make it extremely doubtful that this can actually be done. These factors are:

1. Available Gloucester series soils are only moderately suitable for use in land treatment, reducing acceptable application rates and increasing land area needs.
2. Available sites are scattered, increasing land area requirements.

The combined affects of the above factors brings the total land area required for treatment of the combined flows by rapid infiltration to between 400 and 500 acres. For this reason, it is not believed that sufficient land is available to treat the combined flows of the Towns.

Treatment of flows from Dudley by rapid infiltration may be feasible. Between 50 and 330 acres will be needed to treat Dudley flows only. Since application rates will have to be reduced where Gloucester series soils are utilized and because treatment sites are scattered, the minimum land required would be

100 to 150 acres. Sufficient land may be available within Site 2 for treatment of Dudley flows only.

Recommendations

After consideration of the factors discussed above, it is recommended that further consideration be given to development of a rapid infiltration system capable of treating flows generated in Dudley at Site 2. The following steps should be taken in development of this alternative:

1. Visit the proposed site to become familiarized with terrain.
2. Establish availability and cost of land in the proposed site.
3. Review the geohydrological characteristics of the site as published in existing literature (if any) to estimate groundwater levels, flow direction, and potential for discharging to an aquifer.
4. Perform a conceptual layout and estimate the costs of the proposed system.
5. If this alternative is found to be potentially cost-effective, perform any additional field work such as soil analyses and geohydrological studies required to confirm technical feasibility.

We further recommend that the feasibility of this alternative be reevaluated after completion of each of the above steps.

Mr Cirello

Workshop Meeting and Meeting with Board of Selectmen,
Hodges Village Low Flow Augmentation Study.

NEDPL-PF

Division Engineer THRU: Channels	R. W. Heidebrecht Plan Formulation Branch	20 April 1982 HEIDEBRECHT/lc/547

1. Date of Meeting: 13 April 1982, 3:00 p.m. and 8:15 p.m.

2. Place: Oxford Town Hall, Oxford, MA.

3. Principal Participants:

Workshop Meeting with Oxford Officials

Dennis Power	Town Manager
Mike Heavey	Board of Health

Meeting with the Board of Selectmen

Thomas F. Spooner	Chairman, Board of Selectmen
Frieland C. Peltier	Board of Selectmen
Alice K. Walker	Board of Selectmen
John G. Saad	Board of Selectmen
Dennis Power	Town Manager

Mr. Eric Hall, EPA, and Messrs. Peter Jackson and Richard Heidebrecht, NED, participated at both meetings. In addition, there were approximately 25 interested officials and individuals at the evening meeting with the selectmen. They included representatives of the Board of Health, Conservation Commission, Planning Commission, Recreation Commission and reporters from two local newspapers. Mr. Henry Thomas, Project Manager of the Hodges Village project was alsonin attendance.

4. Report:

The purpose of these meetings was to update local officials on the progress of our study and to invite comments and questions. The afternoon meeting was opened with a discussion of the background of the study followed by a presentation of the details of the low flow augmentation plan. Eric Hall of EPA initiated the meeting by presenting the results of wastewater studies for the French River below Hodges Village Dam. The goal of these wastewater studies was to achieve Class B water quality standards in the French River in Massachusetts and Connecticut. Presently, these standards are violated during low flow periods due to municipal and industrial discharges from Webster and Dudley, Massachusetts, and are compounded by years of sediment buildup in several impoundments in both States. An evaluation of treatment alternatives, which included reuse, land treatment and treatment and discharge, determined that the only feasible method of treating wastewater from Webster and Dudley is the treatment and discharge alternative. This alternative was then evaluated assuming two conditions; low flow augmentation storage is provided at Hodges Village and low flow augmentation storage is not provided. If low flow augmentation is used in conjunction with advanced wastewater treatment, a minimum flow of 22 cfs is required at the U.S.G.S. gage in Webster to meet water quality standards. A preliminary analysis of the with and without low flow augmentation conditions, conducted by EPA, indicates that providing low flow augmentation storage at Hodges Village would result in an annual treatment cost saving of $930,000.

Members of NED then explained the modifications that would be necessary at the Hodges Village project to ensure that a flow of 22 cfs would be maintained at the gage in Webster from June to October. An analysis of discharge records at the Webster gage and at the project, indicate that this streamflow requirement would be met with a reliability in excess of 9 out of 10 days by the creation of a seasonal pool with an initial elevation of 475.6. This pool would have a surface area of approximately 200 acres and corresponds to a pool stage of 10.1 feet. The pool would be slowly drawn down from June to October and by the end of the augmentation season, the pool would be at elevation 472.0. This is the elevation of the small (90 acre) permanent pool recommended for aesthetic purposes. Inasmuch as the water used for augmentation must be of good quality, portions of the reservoir must be prepared prior to inundation. An analysis of the effects that the soil and vegetation within the reservoir would have on water quality indicates that approximately 160 acres will need to be prepared. This preparation ranges from clearing and grubbing of vegetation to clearing, grubbing and the stripping of topsoil down to mineral soil.

To provide finer control of outflows from the dam, modification of the outlet works will also be necessary. The proposed work includes the addition of a "piggyback" gate on one of the existing gates and construction of an approach weir. To ensure the future integrity of the dam with the proposed seasonal and small permanent pool, seepage control measures are also recommended for the downstream toe of the dam. The plan has a total estimated first cost of $3,200,000 and a benefit-to-cost ratio of 2.9 to 1.0.

During and after our presentation numerous questions were asked and comments were made. These are summarized below.

a. What are the major beneficial and deterimental effects on the town of Oxford?

Mr. Power was informed that the major negative impacts would be the plans effects on aesthetics and fish and wildlife. These effects would be mitigated as much as possible. Major beneficial effect would be the increase in flow downstream of the dam and improvement of water quality.

b. How will pool effect existing recreation areas and can additional recreation such as swimming be incorporated?

Developed recreational facilities at the recreation areas presently leased to the town would be 10-15 feet above the proposed pool, and only the perifery of these areas would be affected. Providing additional recreation at the project will be studied in detail during the next phase of the study.

c. Would it be possible to incorporate hydropower at the project with the proposed pool?

Those present were informed that due to the cost of generating facilities, the energy produced would not be justified.

Numerous other questions concerning aggravation of the mosquito problem, what would be done with excavated material and other specifics were asked and fully answered.

A similar presentation was also given at the evening meeting with the Board of Selectmen. This presentation was part of the Selectmen's regular weekly meeting and was open to the public. An open discussion, similar to that held during the afternoon, was held after our presentation.

5. <u>Import/Impact on NED</u>:

Since the study was inactive pending the results of EPA's water quality studies, these meetings were very important in re-establishing contact with local interests. Both meetings went very well and we were thanked by local officials for our efforts.

RICHARD W. HEIDEBRECHT
Plan Formulation Branch

cc:
Mr. Ciriello
Mr. Grossman, PAO
Plan Div Files

Not Used

Planning Division
Environmental Impact

Mr. Anthony D. Cortese, Sc. D. Commissioner
The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Division of Environmental Quality Engineering
100 Cambridge St.
Boston, Massachusetts 02202

Dear Dr. Cortese:

We at the Corps have been studying the engineering feasibility of using Hodges Village Dam for low flow augmentation of the French River in central Massachusetts. The Massachusetts Division of Water Pollution Control has conducted water quality studies which demonstrate the need for low flow augmentation to meet national water quality goals. EPA has also studied and determined that this option, within a total package of wastewater treatment, is economically justified.

Two stages of our three stage planning process have been completed. In the final stage, we will develop an environmental report. To help in this task, we will be holding a Scoping Meeting; this meeting will be held on January 12, 1983, at 1:00 p.m. and at 7:30 p.m. in the Town Hall at Oxford, Massachusetts. (See attached map.) The purpose of the meeting will be to determine the scope of issues to be addressed in the environmental report, and to identify the significance of these issues. The enclosed information package should help in this process. Since we will be determining the scope of the environmental report, please come prepared to be specific in your comments.

Your attendance at this meeting will be of assistance to the Corps in its planning process. If you can not attend but want to supply written comments address them to Mr. Richard Zingarelli this office. If you have any questions Mr. Zingarelli can be reached at 617-647-8557.

Sincerely,

Enclosure

Joseph L. Ignazio
Chief, Planning Division

Copies Furnished:
Mr. Russall Isaac, Div. of Water Pollution Control, P.O. Box 545, Westboro, Massachusetts 01581
Mr. Thomas McMahon, Director, DEQE, Division of Water Pollution Control One Winter St., Boston, Massachusetts 02108
Mr. Dennis Dunn, DEQE, Division of Water Pollution Control, Lyman School Route 9, Westboro, Massachusetts 01581
Mr. David Terry, Dept. of Env. Quality Engineering, One Winter St. Boston, Massachusetts 02108

MODIFICATION STUDY OF HODGES VILLAGE DAM

Introduction

The Army Corps of Engineers is in the process of studying the feasibility of improving the water quality of the French River below Oxford, Massachusetts. The purpose of this information package and the "scoping meeting" to be held on January 12, 1983, is to establish the environmental issues that will be addressed in the upcoming Corps environmental report for the proposal. The format for this package will be the present water quality of the French River, the Corps involvement in the study, the present plan under consideration, and the expected environmental impacts. The scoping meeting in January will determine the significance of the expected environmental impacts and any other impacts that should be discussed in the environmental report.

Water Quality

The French River is classified as Class B waters. The water in the French River periodically falls below the standards for dissolved oxygen (DO), coliform bacteria count, and pH. The reason for the poor water is because of sewer discharges from the Leicester and Oxford-Rochdale treatment plants in the upper basin and from the Webster and Dudley treatment plants in the lower basin. (See Figure 1.) The systems in the two treatment plants in the upper basin are to be improved in 1983, and this will improve the quality the French River waters; however the water will still remain below standards at Webster and Dudley.

Corps' Involvement

In response to requests by the Massachusetts Water Resources Commission, the Environmental Protection Agency (EPA), and Congressman Dodd of Connecticut, studies were initiated in October 1976 under authority provided in Section 216 of the 1970 Flood Control Act, Review of Completed Projects. Studies to provide low flow augmentation for water quality improvement in the French River proceeded until they were postponed in August 1979, pending final endorsement of low flow augmentation by the EPA as a necessary measure for water quality purposes. Based on the findings of an evaluation of wastewater problems in Webster and Dudley, the EPA then indorsed the need for low flow augmentation, resulting in reactivation of our study in November 1981.

Proposed Plan

A number of options for low flow augmentation have been investigated; the present plan calls for:

The creation of a 200-acre seasonal pool behind the Hodges Village Dam. This would store sufficient water to maintain the French River flow at 22 cfs at the stream gage in Webster during June to October. However, the discharge at the dam would be about 10 cfs; the rest of the flow would result from the drainage basin below the dam. This rate of flow would maintain the dissolved oxygen concentration at least 6.0 mg/l and the biochemical oxygen demand at not more than 3.0 mg/l at Webster. About 160 acres, of the 200 acres necessary for the seasonal pool, would require the removal of vegetation and of the 160 acres about 140 acres would require the removal of top soil also. (See Figure 2.) In conjunction with the seasonal pool, a 90 acre permanent pool would be maintained behind the dam.

Expected Impacts

The Corps has made a preliminary evaluation of the expected impacts from the low flow augmentation proposal; these are presented below. Our purpose for this package and the scoping meeting is to determine the significant of the expected impacts and to determine if any other impacts should be addressed in the environmental report.

Impacts

1. Loss of approximately 140 acres of marsh and approximately 20 acres of woodland.

2. Disposal of approximately 600,000 cubic yards of top soil.

3. Construction Activities
   a. increase track traffic

   b. road damage

c. noise

d. dust

e. etc.

4. Improve water quality of French River.

5. Increase or improve aquatic habitat behind dam and in French River.

6. Others

To summarize, the Corps has been requested by EPA to resume the feasibility study for supplementing the volume of water in the French River. This alternative has been determined to be feasible and cost effective. There would be a substantial loss of marsh habitat from this alternative, but there would be a partial replacement with aquatic habitat. Top soil from the site must be removed and disposed of. The major benefits would be the improvement of water quality in the French River and the subsequent improvement of the aquatic habitat. The Corps wants to determine the significance of these impacts and other impacts that might occur from the proposal.

CORPS OF ENGINEERS U.S. ARMY

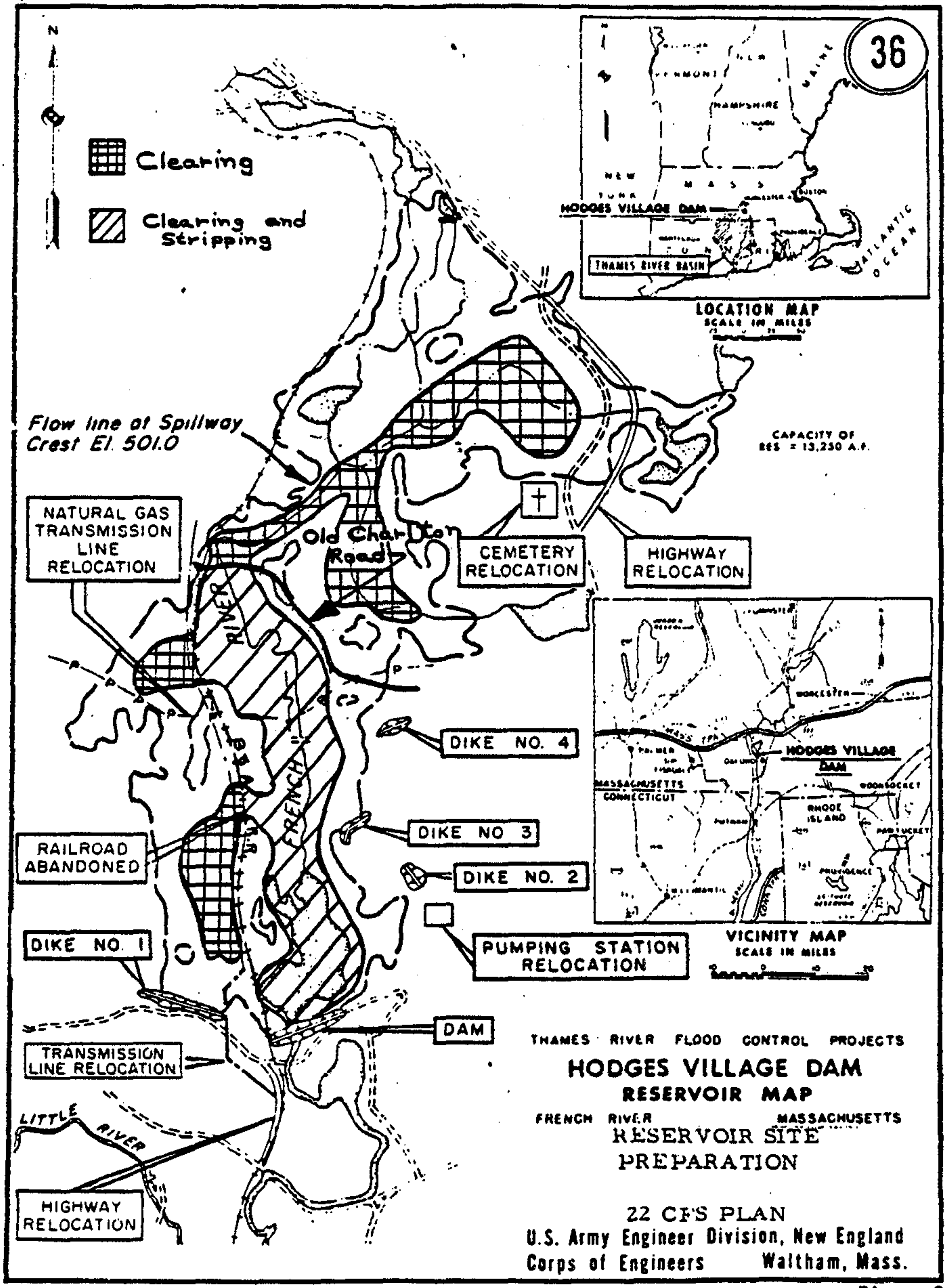
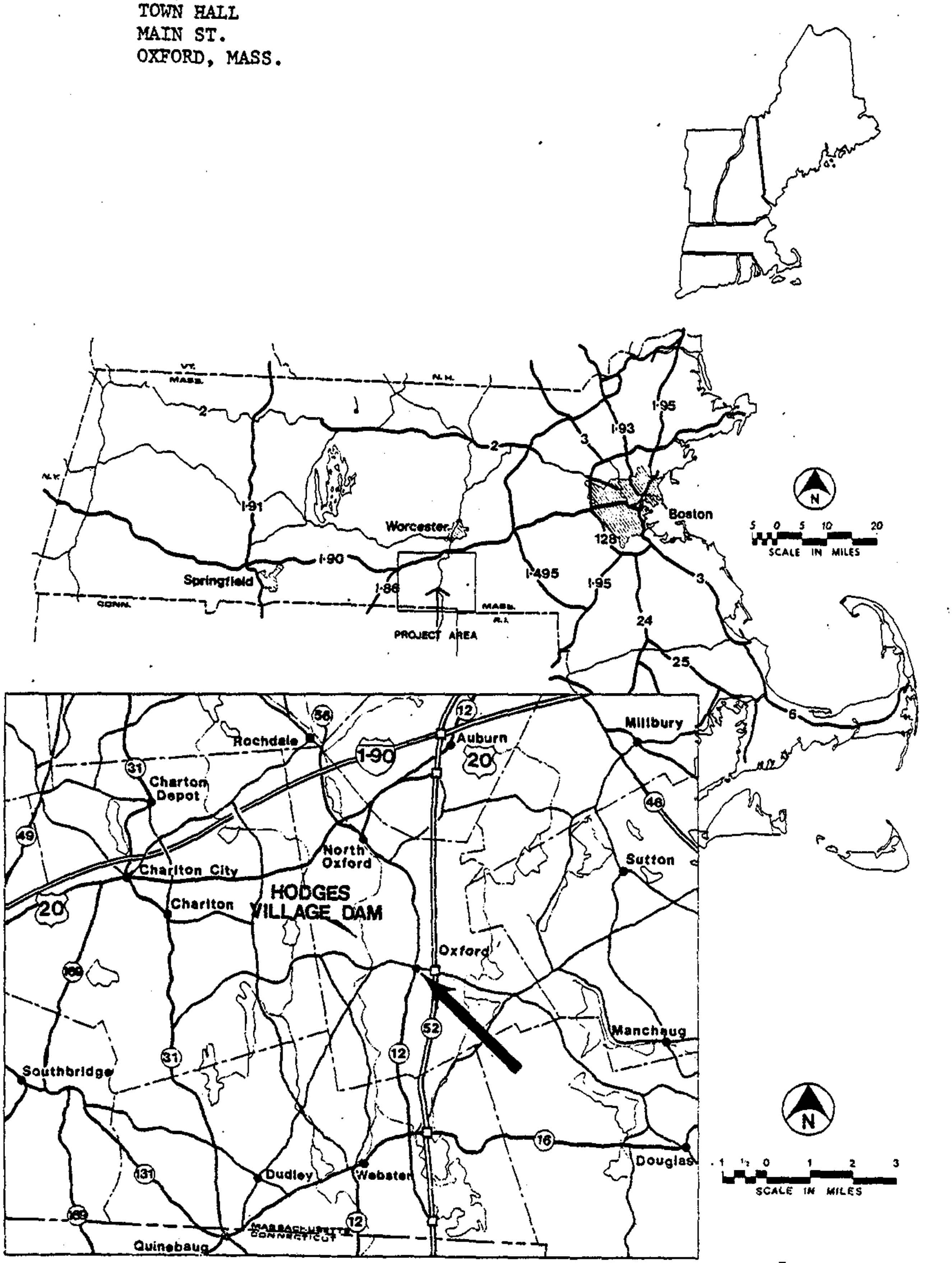


Figure 2

TOWN HALL
MAIN ST.
OXFORD, MASS.



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

January 11, 1983

Mr. Richard Zingarelli
Planning Division - Environmental Impact
U. S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

Dear Mr. Zingarelli:

Thank you for requesting our input for the Scoping Meeting on the Hodges Village Dam low flow environmental study to be held on January 12, 1983. Although my schedule will not permit me to attend this meeting, I would like to take this opportunity to provide the following written commentary.

The water quality of the French River in Massachusetts and Connecticut has been severely degraded for many decades. Summer augmentation of French River flows from the Hodges Village Dam pool is an important element of the water quality management program which has been developed cooperatively by the Connecticut DEP, Massachusetts DEQE and Federal EPA. Extensive water quality studies have concluded that achievement of adopted water quality goals depends on a minimum flow of 22 cfs at the USGS Webster gage <u>in addition to</u> advanced wastewater treatment and sediment deactivation. Connecticut is actively pursuing sediment management for impoundments under its jurisdiction, and is working with EPA and Massachusetts to ensure implementation of AWT for Webster and Dudley.

The environmental effects of the project in Connecticut will be entirely positive. The project will contribute to the elimination of obnoxious odors, the improvement in habitat for fish and other aquatic life, and the restoration of the river as a recreational asset.

Phone:

165 Capitol Avenue • Hartford, Connecticut 06106

An Equal Opportunity Employer

The Connecticut DEP wholeheartedly endorses the Hodges Village low flow augmentation project as beneficial, and necessary to the attainment of adopted water quality goals for the French River. We appreciate your cooperation in this matter and look forward to seeing this project implemented. Please feel free to contact me at any time regarding Connecticut's position on this matter.

Very truly yours,

Stanley J. Pac

Stanley J. Pac
Commissioner

SJP:job

114-N

Trip Report: Hodges Village Low Flow Augmentation Study - Meetings with Federal, State and Local Officials for Scoping of the Environmental Report.

NEDPL-PF

Division Engineer
THRU: Channels

Richard R. Zingarelli
Plan Formulation Branch

21 January 1983
ZINGARELLI/lc/557

1. Date and Time of Meeting: 12 January 1983, 1:00 and 7:30 p.m.

2. Location: Town Hall, Oxford, Massachusetts

3. Principal Participants:

Afternoon Meeting:

Eric Hall, Environmental Protection Agency (EPA)
Dennis Dunn, Massachusetts Division of Water Pollution Control (MDWPC)
Fred Benson, U.S. Fish and Wildlife Service (FWS)
Chris Thurlow, Massachusetts Fish and Wildlife Agency (MA F&W)
Mike Ciborowski, MA F&W
Lee McLaughlin, MA F&W
A.E. Peloquin, New England Interstate Water Pollution Control Commission
Marcia Banach, Northeast Connecticut Regional Planning Agency
Dennis Power, Town Manager, Town of Oxford
Richard Zingarelli, NED, PFB
Peter Jackson, NED, PFB
Del Kidd, NED, IAB
Paul Pronovost, NED, IAB

Evening Meeting:

Ann Weston, Conservation Commission, Town of Oxford
Alice Walker, Board of Selectmen, Town of Oxford
William F. Flagg, Recreation Commission, Town of Oxford
Carlton Thomas, Oxford Business Association
About 20 interested citizens of Oxford
Messrs. Hall, Dunn, Zingarelli, Jackson and Kidd

4. Report:

Meetings were held in the afternoon and evening of 12 January 1983 to discuss the expected impacts of the proposed low flow augmentation plan at Hodges Village Dam, Oxford, Massachusetts. At each meeting, a brief presentation was given to describe the proposed plan, and the impacts that we perceived as part of this plan. The proposed project calls for the creation of a seasonal impoundment at Hodges Village Dam to provide low flow augmentation for water quality improvements in the French River. The seasonal pool would be at a stage of 10 feet, and a permanent pool of 6.5 feet would be maintained for aesthetics. Necessary modifications would consist of clearing vegetation and selective stripping of organic topsoil in the seasonal impoundment area (a total of 160 acres would undergo site preparation), and modifying one of the outlet gates at the dam. We then requested those present to ask any questions they might have about the project, and to state their opinions of the extent of these impacts and any other impacts that they foresaw.

Attendance at the afternoon meeting consisted primarily of representatives of interested Federal and State agencies. Their major concern was that the proposed augmentation pool would adversely affect the existing wildlife habitat of the area. Its wildlife value is unknown, despite the fact that the area has been leased to MA F&W by the Corps for the purposes of wildlife management since 1962, due to the fact that little wildlife management has been done to date. A habitat-based evaluation of the impacts will be performed as part of the environmental report. Many possible methods of mitigating impacts on wildlife were suggested - these will be investigated in our study.

The evening meeting was attended by officials and citizens of the town of Oxford. Their major concern was that Oxford was again being requested to be the host for a project that benefits downstream communities, with only negative impacts on Oxford. The general concensus appeared to be that the town would go along with the project if negative impacts - loss of wetlands, increased traffic - were kept to a minimum, and some type of benefit, e.g., a beach at the permanent pool level or a road to provide access to the western part of town, were made available to Oxford. Again, all the concerns and suggested mitigation measures will be examined in the environmental process.

5. *Import/Impact on NED:*

The comments, questions, and suggestions put forth in the meetings will be used to "scope out" the environmental issues to be investigated in Stage 3 of the Feasibility Study. These issues will be incorporated into our environmental report.

RICHARD R. ZINGARELLI
Plan Formulation Branch

cc:
Mr. Jackson, PFB
Plan Div Files
Mr. Kelly, BMB
Mr. Kidd, IAB

The Commonwealth of Massachusetts

Division of Fisheries and Wildlife

Field Headquarters, Westboro 01581

26 January 1983

Mr. Rich Zingarelli, Study Manager
Hodges Village Low Flow Augmentation
U. S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

Dear Sir:

This letter is in response to the proposed [redacted] in Oxford, Massachusetts.

The Division of Fisheries and Wildlife, Central Wildlife District, is opposed to this project for the following reasons:

1. The poor water quality of the French River is caused by the discharge from inadequate and overloaded sewerage treatment plants of towns bordering the river. It seems logical that the sewerage problem should be corrected at the treatment plants before any potentially environmental damaging projects are constructed.

2. This proposed project will have possible adverse environmental effects on the fish, wildlife and vegetation of the project site and downstream areas.

The Division of Fisheries and Wildlife suggests that some type of habitat and wildlife evaluation study be completed. The study should be broad enough to properly evaluate the project site and determine any gains or losses in wildlife habitat.

Please keep me informed of any developments in this project and if I can be of some assistance.

Sincerely yours,

Chris Thurlow

Christopher Thurlow
Wildlife District Manager

CT:mb

Central Wildlife District Hdqrs.
Temple Street
West Boylston, Massachusetts 01583

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Water Pollution Control
One Winter Street, Boston 02108

ANTHONY D. CORTESE, Sc. D.
Commissioner

May 18, 1983

~~Colonel Carl~~ Sciple CV 25 MAY
Division Engineer
Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02254

Dear Colonel Sciple:

As you are aware, the MDWPC, U.S. EPA, and the towns of Webster and Dudley, Massachusetts have been working towards upgrading the Webster and Dudley wastewater treatment facilities in order to obtain Class B water quality in the French River. To date, facility planning has started on the collection systems and wastewater treatment facilities in both towns and for sludge handling facilities in Webster. The wastewater facility planning is based on water quality modeling of the French River which was conducted by this Division and again by the U.S. EPA. The modeling revealed that three distinct actions are necessary to achieve water quality standards:

1. Advanced treatment at Webster and Dudley wastewater treatment facilities or at a regional facility in Webster;

2. Inactivation of sediment in downstream impoundments in Massachusetts and Connecticut;

3. Low-flow augmentation to 22 cfs at the USGS gage in Webster, Mass.

All three actions are dependent on each other to achieve water quality objectives in the French River. Completion of your studies on low-flow augmentation at the Hodges Village dam is therefore a vital step in producing water quality goals and objectives in the French River Basin.

Thank you for keeping us informed of your progress and we are looking forward to working with you on this vital interstate project in the French River Basin.

Very truly yours,

Thomas C. McMahon
Director

TCM/DRD/ac
cc: A.N. Cooperman
D.R. Dunn

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: October 18, 1983

SUBJECT: September 13, SEA Meeting in Hartford, CT, on the Interstate Transport of Pollutants

FROM: William W. Muzzo
Water Management Division

TO: SEA Working Group on the Interstate Transport of Pollutants

On September 13, 1983, the final meeting of the FY-83 State/EPA Agreement (SEA) Working Group on the Interstate Transport of Pollutants was held in Hartford, Connecticut. This particular meeting of the SEA Working Group focused primarily on the Housatonic River and the related issues of PCB contamination and phosphorus loadings to the River. Important highlights of this quarterly meeting were: a presentation of the status of the Administrative Order negotiations with EPA, MDEQE and GE relative to the feasibility study of remedial actions for the Housatonic River PCB problem; a progress report on the phosphorus removal program in the Housatonic Basin including proposed permit conditions; a discussion of the progress on the French River cleanup efforts, and the low flow augmentation project.

Attachment #1 presents a brief summary of the major points of discussion at the September 13 meeting and highlights the *Actions Needed as a result of this meeting. All participants are encouraged to review the minutes of this meeting and take appropriate action as needed.

The first meeting of the SEA Working Group for FY-84 will be scheduled for either November or December and will be held in northwestern, Connecticut. The meeting will be scheduled to coincide with the next significant action relative to the PCB remedial action feasibility studies. EPA, CT and MA will evaluate progress in early October and establish the date of the next meeting at that time. A brief notice will be sent out prior to the meeting indicating the date and location of the meeting and outlining the tentative agenda of this meeting. If you have any questions on the agenda items, or comments on the attached summary, please contact me at 617-223-5610, or Eric Hall at 617-223-5061.

I would like to thank the participants at the September 13 meeting for their time and effort (attendance list is Attachment #2). I would also like to thank the CT DEP and the Hartford MDC for providing the meeting location.

There were some valuable discussions at the September 13 meeting and I feel that we have made real progress on some very difficult issues.

Attachments

EPA Form 1320-6 (Rev. 3-76)

A T T A C H M E N T #1

SUMMARY OF THE SEPTEMBER 13, 1983, MEETING ON THE INTERSTATE TRANSPORT OF POLLUTANTS

I. Housatonic River

Richard Kotelly, Deputy Director, Water Management Division, EPA, chaired the meeting and introduced the participants.

A. PCB's in the Housatonic River

William Nuzzo (EPA) summarized the recent activities related to the Housatonic River PCB problem and led the discussion of the PCB issue.

1. Update on the EPA/MA Administrative Order (A.O.) with General Electric (GE)

a. As reported at the last SEA meeting, GE completed the Housatonic River Study in December 1982. The detailed EPA/MDEQE review and response was transmitted to GE during May 1983.

b. Since May 1983, EPA, MDEQE and GE have been negotiating the scope and magnitude of the feasibility syudy of remedial actions for the Housatonic River PCB situation.

c. Pat Hynes (EPA) summarized the current status of the EPA A.O. with GE and the EPA strategy on remedial action feasibility studies.

1) The feasibility study will be based upon present EPA policy with respect to approach and scope. The approach to evaluating the most feasible option for cleanup of the river will require a feasibility study of two or more levels of cleanup. This will include cost and engineering analysis of several methods of achieving each of the levels examined. The scope of the feasibility study is to include costs, benefits, implementability, and reliability of each option examined.

2) For the section of the Housatonic River between Woods Pond and Pittsfield, as well as Silver Lake, the feasibility study should be conducted for remedial action down to 50 ppm and 10 ppm PCB in the sediments. For the section below Woods Pond where the Housatonic River indicates contaminated sediments in the range 10 ppm, the feasibility study should be conducted for remedial action down to 10 ppm and 1 ppm PCB.

3) The estimated time of a feasibility study for remedial action is approximately 240 days (not including time for agency review). Costs for various options would be compared by the present worth method.

4) EPA sent a letter to GE on 9/9/83 presenting the EPA strategy for feasibility studies of remedial actions and a draft of the amendment to the Consent Order. EPA, MDEQE, and GE will be meeting on 9/28/83 to resolve the magnitude and scope of the remedial action studies.

5) Using CERCLA (Comprehensive Environmental Response Compensation and Liability Act of 1980) resources, EPA will complete the remedial action feasibility study should GE not do so.

d. Steve Joyce (MDEQE) reported that the MDEQE intends to hold a public meeting in the Pittsfield area to discuss the PCB issue as soon as the scope of the remedial action feasibility study is resolved.

2. <u>CT DEP Strategy and Additional Activities</u>

a. Connecticut is continuing their fishing advisory through 1983.

b. Charles Fredette (CTDEP) reports that CT is planning to update the human health effects study completed by CAES sometime this winter.

c. Robert Moore (CTDEP) reported on discussions held with GE relative to providing additional information on the CT portion of the River.

3. <u>MDEQE Strategy and Activities</u>

a. The USGS completed a draft report prepared under a research and demonstration contract for the MDWPC. The study considered: PCB contamination of groundwater and PCB transport in the MA portion of the Housatonic River. The MDWPC and USGS review should be complete within a few weeks.

4. <u>Additional Activities</u>

a. Stewart Labs, GE's consultant, is continuing the sediment transport studies.

b. PCDF samples are in Sweden for analysis. No additional information is available at this time.

*Actions Needed

1. EPA/MDEQE meet with GE to negotiate a strategy for remedial action feasibility studies.

2. EPA, CTDEP, and MDEQE evaluate progress in negotiations with GE and schedule the next SEA for November or December.

B. Housatonic River Basin Phosphorus Problem

1. Eric Hall (EPA) reviewed the phosphorus problem in the Housatonic River and led the discussion concerning the coordinated sampling and analysis of sources and sinks of phosphorus on both sides of the State line.

   a. MDEQE and CTDEP have arrived at opposing conclusions using the 1981 and 1982 Housatonic water quality survey data. EPA, agreeing with CT, believes that Pittsfield should seasonally remove phosphorus to improve the quality of Lake Lillinoah. MDEQE believes the data do not support a link between Pittsfield's phosphorus and downstream effects in Lake Lillinonah.

2. NPDES Permit Conditions

   a. Pittsfield municipal - EPA has drafted a permit for Pittsfield which requires phosphorus removal from May 15 through September 15 to 1.0 mg/l. This permit will undergo thorough public review.

   b. Due to the controversy related to the Pittsfield permit, a hearing will be held in Pittsfield on November 2, 1983, at which testimony will be presented concerning the limits in the NPDES permit.

   c. GE/Pittsfield and Kimberly-Clark - EPA has drafted permit based on data submitted by Kimberly-Clark with limits on phosphorus. These low concentrations of phosphorus will be maintained through careful addition of phosphoric acid to the biological treatment system.

   d. CT DEP reported that Nestle's Corporation had a phosphorus removal system operational at its treatment plant in May, 1983.

3. CT Lakes Studies

   a. CT will continue to collect a small number of samples from the Housatonic impoundments in order to determine the trophic status and trends in the lakes.

*Actions Needed

1. EPA has circulated a public notice announcing the date and location of the hearing on the draft Pittsfield NPDES permit in the City Council chambers in Pittsfield City Hall at 7 p.m., November 2, 1983.

2. CT DEP coordinate with New York State on point source and NPS loading to Ten Mile River. EPA Region I will assist in gaining the cooperation of Region II and NYS.

II. French River Clean Up

EPA discussion leaders Dick Kotelly, Deputy Director, Water Management Division; Eric Hall, Water Quality Branch.

A. Enforcement Actions/Facilities Construction

1. Metcalf and Eddy has developed cost figures for all of the practical alternatives. Webster and Dudley have chosen to participate in a joint facility but have yet to agree on whether to have a district or a contract with Webster being sole owner.

2. EPA will issue Administrative Orders for Step 2, Step 3, and initiation of operation as soon as the towns have chosen the desired alternative.

B. In-Place Pollutants

1. MDWPC sampled the Perryville sediments in August, 1982, and reported high levels of metal contamination. Further study, unplanned as of now, is required before restoration can take place.

2. CT DEP indicated that a state-owned dredge could possibly be made available in the Thompson, CT, area in 3-4 years to work on the French River impoundments in CT.

C. Low Flow Augmentation

1. The Corps is proceeding with an EIS on the Hodges Village flow augmentation project. The draft Habitat Evaluation Process report is completed.

2. U.S. Fish and Wildlife Service has raised several objections to the low flow project due to impacts on the wetland habitat.

*Actions Needed

1. EPA will issue Administrative Orders to Webster and Dudley for the completion of facility planning and preparation of plans and specifications.

2. MDWPC will prepare and distribute data report on 1982 sampling of the French River and sediments in the Perryville impoundment.

3. MDWPC will respond to Webster on the sludge handling plans.

4. EPA, DEP and DWPC will respond to U.S. Fish and Wildlife comments on the Hodges Village project.

III. Connecticut River

Discussion leader Eric Hall, Water Quality Branch.

A. Massachusetts Combined Sewer Overflow Strategy

1. MDWPC will be interviewing consultants for the engineering work necessary in the seven towns. It is anticipated that work will begin this fall and will be completed during 1984.

IV. Interstate Groundwater Protection

This new area of consideration for the SEA process in 1983 was a topic requested by CT.

Jennie Bridge (NEI) reported on the activities of the NEI groundwater working group which has been in existence for 2 years. A report on the interchange of materials between States was presented; MA and CT are plannning to develop a memorandum of understanding on the groundwater classification.

Attachment #2

Attendance SEA Meeting - 9/13/83 - Hartford, CT

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J. F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

December 9, 1983

Mr. William C. Ashe
Deputy Regional Director
U.S. Fish and Wildlife Service
One Gateway Center, Suite 700
Newton Corner, MA 02158

Dear Mr. Ashe:

As agreed to at our meeting of October 12, 1983, my staff has prepared responses to the nine points raised in your letter of September 14, 1983. We were assisted in this effort by the Massachusetts Division of Water Pollution Control, the Connecticut Department of Environmental Protection and the United States Army Corps of Engineers. We believe the issues you raised are significant, and we are confident that they have been addressed during the lengthy history of the Webster and Dudley projects. We have prepared concise answers to your questions and indicated, where appropriate, the title and available source of the references used should you desire more detailed information. These responses are on the attached pages.

As further agreed to among the representatives of Fish and Wildlife, the Corps of Engineers and the Environmental Protection Agency, our responses will be included in the Corps of Engineers' Draft Environmental Impact Statement (DEIS) on the low flow augmentation project. Under Part 1502.21 of the Council on Environmental Quality regulations implementing the National Environmental Policy Act, this evaluation of alternatives to the low flow augmentation project (including the references) will be "incorporated by reference" into the DEIS on the Corps' Hodges Village project.

Please feel free to contact me if you have any questions or desire further information. I look forward to receiving your reply as I share with you the desire to proceed with the French River cleanup to restore this valuable interstate stream.

Sincerely yours,

Richard P. Kotelly
Deputy Director
Water Management Division

Attachments

Vernon Lang, U.S. F&WS
Joseph Ignazio, C.E.
Russell Isaac, MA DWPC
Robert Smith, CT DEP
Chris Thurlow, MA Div. Fisheries and Game

1. Buffumville Reservoir is the only surface water source that could be considered by the Corps of Engineers as an alternative to the Hodges Village project for low flow augmentation. Buffumville, located on Little River, is a Corps project Congressionally authorized for flood control and recreation purposes. Development of low flow augmentation at Buffumville as a substitute to augmentation from Hodges Village would require a study to determine its feasibility and impacts on authorized purposes and on the environment of the project. The Hodges Village study has shown augmentation to be feasible and that it would not significantly affect the flood control purpose or require the acquisition of new lands. Therefore, modifications at Hodges Village may be implemented under the existing authority of the Chief of Engineers, without Congressional authorization.

At the initiation of the low flow augmentation study, both Hodges Village and Buffumville were considered as potential surface water sources. The primary augmentation was chosen to be Hodges Village because augmentation could be developed there without significant impact on the authorized purpose or existing recreational facilities. Buffumville's recreational facilities are on the shore of the existing pool; an increase in the pool for augmentation purposes would involve relocation or other modifications to these facilities. Modifications could also impact a prehistoric archeological site located on the shore of Buffumville.

Additionally, water quality tests taken over the past few years have shown nutrient levels in the impoundment at Buffumville to be rather high, particularly levels of phosphorus. Even with proper reservoir preparation, such as stripping of organic soil at the reservoir bottom, high inflow nutrient levels in a large pool could cause algae blooms which would make releases unsuitable for low flow augmentation. Conditions in the existing pool at Buffumville will not adversely affect French River water quality if augmentation is instituted at Hodges Village as proposed, since Little River flows will be small compared to high quality releases from Hodges Village during the critical summer months.

Other surface water source for dilution water in the French were considered but were eventually ruled out due to insufficient drainage area to provide the necessary flow and/or the adverse recreational impacts. Most of the ponds and lakes in the basin are used for a variety of recreational purposes. This recreation is at its maximum during the summer months in the form of swimming, fishing, and boating. The augmentation flow is required only during the summer months making it it necessary to draw down the lake or pond since none has capacity to store spring runoff. The pond then has no available recharge of water lost during the summer. Most of the lakes in the basin are considered shallow (less than 20 feet) and any further drawdown would adversely affect their recreational value, not to mention water quality.

2. The pumping of groundwater to the French River as an alternative means of low flow augmentation was not given serious consideration for a number of reasons:

a. If pumping were done during periods of high groundwater, it would have to be stored until the dry season. This would lead to a similar operating plan at Hodges Village, or other storage site, as is envisioned with the storage of surface runoff in the current plan.

b. If groundwater were pumped during the period when low flow augmentation is needed, the very groundwater that supplies the "base flow" to the River to the River would be the augmentation source. The net result would be little, if any, increase in the base flow at a very high energy cost.

c. Groundwater in the French River Basin is a valuable resource and currently supplies potable water to the towns of Leicester, Charlton, Auburn, Oxford, Dudley, and Webster. Present supplies, however, are already overtaxed. The town of Dudley is running out of water and will have to seek new sources for its supplies in the near future. Leicester, which has three water supply districts which rely primarily on groundwater for their drinking water supply, is at present building a reservoir at Moose Hill to meet future demand. In addition, the opening of Route 52 through the town of Oxford is likely to attract more housing and industry which may place a heavy burden on their water supply.

It should also be noted that during periods of low flow, which is when augmentation is needed, the majority of flow to the French River is groundwater related. Since all the towns use groundwater for drinking water purposes, the flow from the municipal wastewater treatment plants is in fact derived from the groundwater. Without this flow the only flow in the river during low flow periods would be that which originates in the numerous wetlands of the basin or that which runs off after storm events.

3. Use attainability analyses are conducted when:

- designating uses inconsistent with "fishable/swimmable" goals of the Clean Water Act (CWA);
- removing designated uses specified in the CWA, i.e., "downgrading"; and
- adopting subcategories of a use that require less stringent criteria.

The classification and use designation on both sides of the state line are appropriate, attainable and consistent with the CWA. Since no "downgrading" is anticipated (See Number 4 below), a use attainability analysis at this time serves no purpose.

4. The French River from its headwaters in Leicester, MA, to the Massachusetts-Connecticut state line is classified by the Massachusetts Water Quality Standards as a Class B waterway and is designated for use as a warm water fishery and suitable for primary and secondary contact recreation. Generally the river upstream of Webster/Dudley meets this criteria. In fact, there is a large recreation facility in the Rochdale section of Leicester, MA, which includes a beach on Rochdale Pond, an impoundment on the French River. Water quality problems do exist in certain areas due to insufficient wastewater treatment particularly below the Leicester Water Supply District and Webster and Dudley discharges. These problems, however, are correctable and the classification can be achieved. The only situation where a change in classification may be warranted is when irreparable damage has occurred and uses cannot possibly be attained. This is not the case in the French River in Massachusetts.

The Connecticut Department of Environmental Protection (DEP) does not consider a change in the water quality classification as a practical or publicly supported action at the present time. Revised classifications for the Thames River Basin were adopted on June 4, 1982, and the French River is classified as B. A Class B designation in Connecticut provides for a wide range of protection from preservation of trout and other salmonid species including spawning to restoration to a warm water fishery. The only numerical criteria that applies is a minimum dissolved oxygen level of 5.0 mg/L which, in fact, represents a stream quite heavily loaded with organic contaminants. In the case of the French River, the Connecticut DEP is seeking restoration to a level that would support a healthy aquatic community but does not envision restoration to a level sufficient to support the most highly prized and sensisitive species. This lower side of the Class B range is the minimum goal in Connecticut statewide and considered consistent with the national goals.

5. Requirements for greater levels of wastewater treatment at various point source discharges in the French River Basin have been addressed many times and have been documented by the Division of Water Pollution Control in The French and Quinebaug Rivers, Part D, Water Quality Management Plan, 1975; and The French and Quinebaug River Basin, Water Quality Management Plan, 1981 update. Other publications which identify the need for advanced treatment at various locations are the Areawide Water Quality Management Plan, August 1979 written by the Central Massachusetts Regional Planning Commission and numerous facility plans prepared by the consultants of the individual municipalities. These reports are available from the Massachusetts Division of Water Pollution Control (MA DWPC).

To date extensive water quality modeling of the French River has been conducted by the United States Environmental Protection Agency (EPA) and the state of Massachusetts to determine the allowable total daily maximum loads from all of the point source discharges within the basin. These modeling efforts revealed that three distinct actions are necessary to achieve water quality standards in the French River. Actions include low flow augmentation, inactivation of oxygen demand sediments and upgrading the secondary wastewater treatment facilities in Webster and Dudley to an advanced level. In addition, the wastewater treatment facility in Leicester, MA, is being upgraded to advanced treatment to insure good water quality upstream of Hodges Village.

Industrial discharges to the French River have been substantially reduced. Since 1975, four major industrial discharges have been eliminated and include Anglo Fabrics Inc., Cranston Print Works, and Webster Lens Co. all which reside in Webster; and Carleton Woolen Co. in Rochdale. The only remaining industrial discharges are Gordon Chemical Co. which discharges non-contact cooling water and Worcester Tool and Stamping Co. which treats plating wastes before discharging to the French River in Leicester. These industries do not affect the the water quality problems in the Oxford-Webster area.

6. Non-point sources in the French River have been addressed by the Central Massachusetts Regional Planning Commission in its Areawide Water Quality Management Plan, August 1979. In addition, the Massachusetts Division of Water Pollution Control has conducted intensive water quality surveys on the French River From Leicester, MA, to Putnam, CT, in 1972, 1974, 1976, and 1982. All data to date reveal that inadequate treatment at Leicester, Webster, and

Dudley are responsible for the water quality violations in the French River. Non-point problems, if any, have been completely masked by the magnitude of the point source problems, and, therefore, cannot be properly assessed. Once the point source problems have been abated the Division will conduct additional sampling to determine the effectiveness of the and the impact of non-point pollution, if any, within the basin. The survey results are available from MA DWPC.

7. Consideration of relocating point source discharges in the French River Basin to other receiving waters with greater assimilative capacity has been made in the case of the Leicester Water Supply District. One option for the district was an interbasin transfer to discharge to the Worcester sewer system. This option, however, was found not to be cost effective and therefore the district is proceeding with facility plans to upgrade its present secondary treatment to advanced treatment with the discharge to the French River. It should be noted that the chosen option should benefit the French River since the district provides the headwater flows in the French River during the summer months thus providing dilution and habitat.

In Webster and Dudley no other options are feasible. The only receiving water in the area with any assimilative capacity during low flow conditions is the Quinebaug River which is already influenced by discharges in Southbridge, the municipal treatment facility and the American Optical Corporation. In fact, the Southbridge Wastewater Treatment Plant has been required to provide advanced treatment to prevent water quality violations in the Quinebaug River. The Corps of Engineers maintain a recreational impoundment, West Thompson Lake, on the Quinebaug River in Connecticut which is already stressed. Addition of treated wastewater from Webster and Dudley would not be allowed.

8. The impact of future development on the needs of additional treatment and/or treatment works including dilution water in the French River basin has been considered. Currently, all of the towns in the French River basin have municipal wastewater treatment facilities to treat their domestic and/or industrial wastes. The one exception to the rule is the town of Oxford. With the completion of Route 52, it is expected that this town will experience development and, therefore, may need a sewer system in the future. This assumption was then incorporated into the facility planning process for the Webster/Dudley regional facility and in the water quality model of the French River. The model indicated that there would be available assimilative capacity below Hodges Village and above Webster/Dudley to accommodate a discharge of treated effluent from the town of Oxford, providing the projected low flow augmentation is available.

In areas where municipal facilities already exist, such as in Webster, Dudley, and Leicester, the impact of future development is being addressed during the facility planning process. The facility planning allows for a certain amount of flow due to future industrial expansion. These flows can be in the form of committed industrial flows or percentage of current flows.

9. Sediments in the impoundments below Webster and Dudley have been the subject of several studies which provide information on sediment quantity, quality, toxicity and disposal. The following is a list of available reports with notes on their content and where they may be obtained:

a. United States Army Corps of Engineers "Section 22, French River Report" 1977 (available from Corps or CT DEP). Physical characteristics of impoundments, water depths, sediment thickness profiles, physical characteristics of sediments, chemical characteristics of sediment with emphasis in heavy metals, sediment volumes.

b. U.S. EPA Region I,"Sediment Oxygen Demand, French River" 1978 (EPA Regional Office) - Reports impoundment SOD's for 12 sites in Massachusetts and Connecticut.

c. Connecticut 208 program and MRE, Inc., "French River/Oxoboxo River Impoundment Study" April 1981, (CT DEP) - Evaluates the feasibility of various alternatives for removal and/or treatment of impoundment sediments.

d. Connecticut 208 Program and MRE, Inc. "Environmental Assessment of the Alternatives Available for Environmental Restoration of North Grosvenordale and Langer's Pond Impoundments on the French River in Thompson, CT," April 1981, (CT DEP) - Environmental assessment of dredging, including disposal, and capping.

e. Connecticut 208 Program and Notheastern Connecticut Regional Planning Agency (RPA), "Potential for Recreational Development, North Grosvenordale Pond/ Langer's Pond" 1980, (CT DEP) - Concludes that the town of Thompson has a need for swimming and recreation facilities in North Grosvenordale which could be developed at the impoundments.

The town of Thompson has formed a committee to complete restoration feasibility studies and to oversee implementation. The committee is presently exploring avenues of funding with assistance from the Northeastern RPA and Connecticut DEP. In response to a request from the town, the DEP has committed a state-owned Mud Cat dredge to the project.

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:
Planning Division
Impact Analysis Branch

December 16, 1983

Ms. Valerie A. Talmadge
Executive Director
Massachusetts Historical Commission
294 Washington Street
Boston, MA 02108

Dear Ms. Talmadge:

Enclosed for your review is a report entitled "Intensive Archaeological Reconnaissance of the Hodges Village Low Flow Augmentation Project in Oxford, Massachusetts," prepared by the OPA, Boston University.

The researcher located no significant historic or prehistoric resources within the area which would be stripped of topsoil and subsequently inundated by storage for this project (i.e. below 475.6 NGVD). Therefore, no effect is anticipated from topsoil stripping during construction or from subsequent project operation.

Equipment access to the project area would be primarily over the existing road system, but some overland entry may be required. Any such overland corridors will be surveyed during the design stage of this project for presence of archaeological resources above 475.6 NGVD. If potentially significant resources are located at that time, avoidance through access route adjustments can probably be accomplished in lieu of archaeological salvage. We will further coordinate such activity with your office at that time.

It should be noted that, while we feel that this survey adequately covers all project areas below 475.6 NGVD, government property above that elevation was not examined, as it will be unaffected by low flow augmentation, with the possible exception noted above. The remaining government property at Hodges Village Dam is presently scheduled for study in our reservoir survey program during fiscal year 1987.

We look forward to receiving your comments in a timely manner, for incorporation in the project environmental impact statement, which is nearing completion.

Sincerely,

Joseph L. Ignazio
Chief, Planning Division

Enclosure
as stated

Copy Furnished:

Mr. Lloyd Chapman (w/Encl)
Office of Cultural Programs
Mid-Atlantic Region
National Park Service
143 South 3rd Street
Philadelphia, PA 19106

cc:
Mr. Wilson
Mr. Tomey
Mr. Zingarelli
Plng Div Files

MASSACHUSETTS HISTORICAL COMMISSION

COMMONWEALTH OF MASSACHUSETTS
Office of the Secretary of State
294 Washington Street
Boston, Massachusetts
02108
617-727-8470

MICHAEL JOSEPH CONNOLLY
Secretary of State

January 4, 19834

Joseph L. Ignazio
Chief, Planning Division
Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02254

RE: Hodges Village Low Flow Augmentation Project, Oxford

Dear Mr. Ignazio:

Thank you for submitting to the Massachusetts Historical Commission a copy of the report entitled "Final Report on the Intensive Archaeological Reconnaissance of the Hodges Village Low Flow Augmentation Project in Oxford, Massachusetts," which was prepared by the Office of Public Archaeology.

The results of the survey indicate that the proposed inundation project is unlikely to affect significant cultural resources below 475.6 NGVD.

You have pointed out, however, that the impact areas of proposed overland access corridors for construction equipment traffic have yet to be surveyed. Massachusetts Historical Commission recommends that these access corridors be surveyed as early as possible in the designing stage of the project, in order to insure the flexibility of design modifications to avoid significant sites should they be identified. This survey is required in compliance with Section 106 of the National Historic Preservation Act of 1966 (36CFR 800).

If you have any questions concerning this review, please feel free to contact Brona Simon of Massachusetts Historical Commission staff.

Sincerely,

Valerie Talmage

Valerie Talmage
Deputy State Historic Preservation Officer
Executive Director
Massachusetts Historical Commission

cc: John Wilson, Army Corps of Engineers

VT/pb

404 (b) (1) EVALUATION

FOR HODGES VILLAGE

LOW FLOW AUGMENTATION PROJECT

Section 404(b)(1) Evaluation for the Hodges Village Low Flow Augmentation

1. References

a. Section 404(b)(1) of Public Law 92-500, as amended, Clean Water Act.

b. 40 CFR Part 230 Subparts B, C, D, E, F, G, and H dated 24 December 1980.

c. EC-1105-2-104, Appendix C, dated 30 September 1980.

d. ER 1105-2-50, Appendix F, dated 29 January 1982.

2. Project Description

a. General Description

The proposed action would consist of the creation of seasonally fluctuating impoundment at Hodges Village Dam and Reservoir to maintain a flow of not less than 22 cubic feet per second (cfs), approximately 10,000 gallons per minute, at the French River stream gage in Webster, Massachusetts from June to November. An analysis of the discharge records at Webster and Hodges Village Dam indicates that with 0.3 inch of runoff of reservoir storage available for flow augmentation, this streamflow requirement would be met with a reliability in excess of 9 out of 10 days between 1 June through 31 October. The 113 acre permanent pool would be at about elevation 472 feet NGVD (stage of 6.5 feet) and have a storage capacity of 190 acre-feet, which is equivalent to about 0.1 inch of runoff.

The permanent pool would be filled from 1-31 May for the augmentation storage. During the augmentation period (1 June to 31 October), pool elevations would range from a high of 475.6 feet NGVD (1 June) to a low of 472 ft NGVD (31 October). The proposed rate of drawdown is shown in Figure I-1 of accompanying Draft Environmental Impact Statement (DEIS). This would insure sufficient storage to allow flow augmentation throughout the season. The drawdown on water would expose a maximum of 7 acres of shores. The facility would be operated to maintain the permanent pool. A more detailed explanation of the project operation may be found in the Engineering Report for Low Flow Augmentation at Hodges Village Dam.

To minimize debris maintenance problems and maintain water quality, almost all of the 180 acre impact area would require site preparation consisting of approximately 60 acres of clearing and grubbing and approximately 120 acres of clearing, grubbing and stripping of loam and forest floor debris down to mineral soil. The extent of the areas are shown on Figure I-2 of DEIS. It is estimated that 265,000 cubic yards of organic material would need to be removed and stockpiled in gravel pits in the reservoir area. Approximately 15,000 cy would be used for land reclamation of the gravel pits in the reservoir area. The remainder would be sold to entities outside of the project area at the construction contractors discretion. Modifications to the reservoirs wetland and upland areas would partially mitigate wildlife habitat losses due to project construction.

The proposed work in the wetlands involves habitat improvements of these areas for the purpose of enhancement of carrying capacity for wildlife populations. Analysis of the habitat indicated that the improvements would be accomplished by maximizing (1) the water/land interface or "edge" and (2) the area with water depths 18 inches or less. These improvements were proposed for 3 wetlands; Marshes A, B, and C (Figure V-4, V-5 of DEIS). Work in Marsh A would involve creating 800 feet of 5-foot wide ditches radiating from an existing central pool (Figure V-5). Fill material would be added in the new ditches to achieve water depths appropriate for cattail development. Work in Marsh B involves the discharge of fill for the construction of four enlarged hummocks or islands with a total area of about one acre (Figure V-5). Finally, Marsh C would require deepening to create a shallow permanent pool in the assymetrical pattern shown in Figure V-5. The proposed work includes a modification of one of the two existing 6-foot high by 5-foot wide gates and construction of an approach weir (approximately 7' by 3') upstream of the other gates. To ensure the future integrity of the dam with the proposed seasonal and permanent pool, seepage control measures are also proposed for the downstream toe of the dam. These measures are shown on Figure I-3 of DEIS. This proposed activity would require approximately 1/4 acre. Construction would probably take place during the summer and fall seasons.

b. Authority and Purpose

The proposal is a modification of an existing project which can be performed under the discretionary authority of the Chief of Engineers in accordance with Engineering Regulation (ER) 1165-2-119.

The purpose of the project would be to provide low flow augmentation for water quality improvements of the French River in Massachusetts and Connecticut.

c. General Description of the Fill Material

The fill material would be made up of organic and mineral soils already present within the confines of the project area. The organic soils primarily consist of loam and some peat and clay to be removed from uncontaminated sources within the 180 acre impact area. The mineral soils are primarily gravel and sand which would be removed from uncontaminated sources within the impact area or existing nearby sand and gravel operations.

d. Description of the Discharge Sites

Temporary and permanent discharges would take place throughout the 180 acre impact area within Hodges Village Reservoir (Figure I-2 of accompanying Draft Environmental Impact Statement). The fill areas include 11 acres of the French River upstream of Hodges Village Dam and 130 acres of associated wetlands. The wetlands include 58 acres of red maple swamp, 51 acres of shrub swamp including 9 acres of bog, and 21 acres of emergent herbaceous marsh (Figure IV-4 of DEIS). The areas are both permanent and seasonally flooded and are dominated by hydrophytic vegetation.

The discharge for the fill activities would take place during the summer and fall construction periods. Temporary fill would be used to dewater and to divert the French River away from work areas. It would remain for varying amounts of time until the work in the dewatered is completed. Permanent fill would involve development of new wetlands in the form of islands and peninsulas and the modification of existing wetlands adjacent to the proposed permanent and augmentation pool for the purpose of wildlife mitigation.

e. Description of the Disposal Method.

The fill would be deposited with the use of bulldozer, backhoe or a crane mounted on the dewatered areas.

3. Factual Determinations (Section 230.11)

a. Physical substrate determinations.

Placement of the fill for the cofferdams in the project area would temporarily alter the topography of the area for the purpose of dewatering work areas or diversion of the French River. The substrate used would be the same material already present within the impoundment. The material, however, would be compacted to prevent water sepage. The cofferdams would remain in place at various locations within the impact area throughout the construction season.

The quality of the sediments in Marshes A, B and C could not change because the topsoils would not be totally stripped. However, the channeling and filling in Marsh A, the creation of islands in Marsh B, and the deepening of Marsh C would permanently alter the topographic features in each area. These features would enhance each area for wildlife habitat by maximizing (1) the water/land interface or "edge" and (2) the area of water depths less than 18 inches for waterfowl and wading birds.

b. Water circulation, fluctuation and salinity determinations.

The purpose of the proposed discharge for the cofferdams is to temporarily alter the current water circulation pattern so that work can be done in the dry. This would alter the surface water drainage within the impact area during the construction phase of the project. Downstream flows would be maintained throughout the period.

The permanent pool could be raised 3.5 feet during May and released gradually over the summer and fall to augment downstream summer low flows. Otherwise, the seasonal water fluctuations caused by flood control operations would continue to occur as in the past. Deepening of Marsh C (Figure V-5) would enhance water circulation of that area. Salinities determinations not applicable to this project.

c. Suspended particulate/turbidity determinations.

Increased suspended solids and, hence, turbidity levels are expected to result from the earthmoving and discharge activities throughout the construction period. Construction in the "dry" afforded by the cofferdams and the use of appropriate sediment control measures such as silt curtains, sedimentation basins, hay bales, construction cloths or phased construction which would limit the exposed area at any one period of time would minimize the downstream effects. However, runoff or flood storage operation during the construction period would probably have the secondary effect of enhancing sedimentation in the French River immediately below the dam and Auguttenback Pond which is located about 600 feet downstream. The pond would act as a sedimentation basin minimizing further effect downstream of the pond. The increased turbidity levels would cease when construction activities are completed. The accumulated sediments in the downstream pond would be monitored and dredged to restore the ond to preconstruction conditions.

d. Contaminant determination.

The fill used for the cofferdam would be derived from uncontaminated sediments within the project area. Other than the temporary increases in suspended solids and nutrients, little or no increases in contaminants derived from the fill material are anticipated.

e. Aquatic Ecosystem and organism determinations.

The placement of fill material would remove aquatic and wetland habitat during the construction period. Organisms buried under the fill would perish. All of the river and wetland habitat within the impact area would eventually be removed during the construction phase of the project. This, however, would be replaced in part by the development of a 113 acre lake which would provide an enlarged fishery habitat. The improved wetlands would provide a high quality wetland habitat for a variety of wildlife species.

The secondary effects of sedimentation described above in c. would include burial or smothering of aquatic organisms in the French River immediately below the dam and in Auguttenback Pond. In addition, the sedimentation would probably lead to anoxic conditions in the pond's bottom waters during the summer months which would stress aquatic organisms in the area. These impacts would cease when construction activities are completed and the pond would be dredged to restore the aquatic habitat. Seasonally high stream flows would remove sediments in accumulation areas of the river downstream of the dam.

f. Proposed disposal site determinations.

The mixing zone determination is not applicable to this project.

g. Determination of cumulative effects on the aquatic ecosystem.

The cumulative effects of the proposed discharge would be the loss of habitat, productivity and wildlife within the discharge areas. The cumulative effect of the project would be the ultimate loss of the 130 acres of wetlands and 11 acres of river which would be mitigated with the improvement of 35 acres of wetland habitat as well as a 113 acre permanent pool.

h. Determinations of secondary effects on the aquatic ecosystem.

The secondary effects on the aquatic ecosystem have been described above in Sections c and e.

4. Findings of Compliance with the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. There are no practicable alternatives to the proposed discharge site which would have less adverse impact on the aquatic ecosystem. Without the proposed project, the water quality goals of the French River would not be met. Other alternatives considered would not be technically or economically feasible. The discharge of the cofferdams is the only means to dewater the work areas to perform the necessary work without significant water quality impacts.

c. The proposed work may cause intermittent and restricted increases in turbidity which would occur during the construction period. The disposal operations will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. Use of the disposal site will not harm any Federal listed threatened or endangered species or their critical habitats.

e. The proposed discharge would not result in significant adverse effects on human health and welfare. The proposed construction activities and the removal of 130 acres of wetland and 11 acres of riverine habitat from the project area would cause impacts to local fish and wildlife.

However, creation of the permanent pool would have a five fold increase in fish habitat. The proposed mitigation plan would replace about 47% of lost wildlife habitat.

f. Steps to minimize potential adverse impacts of the discharge on the aquatic systems would be appropriate silt control measures such as silt curtains, sedimentation basins, hay bales and construction cloths to prevent erosion. The measures chosen would be determined at a later stage of planning. If the downstream pond accumulates sediment during the construction period, this area would be restored to preconstruction conditions when construction is completed.

g. On the basis of the guidelines the disposal sites for the discharge of fill material are specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem.

h. Implementation of the project with other measures proposed by the Environmental Protection Agency allow Class "B" instream standards to be met downstream of the project.

i. The proposed discharge with the mitigation measures meets the requirements specified in Section 230.10.

The proposed discharge sites along the French River in Oxford, MA, have been specified through the application of Section 404(b)(1) Guidelines. The project files and Federal regulations were reviewed to properly evaluate the objectives of Section 404(b) of Public Law 92-500, as amended. A public notice with respect to the 404 Evaluation will be issued accompanying this document. Based on information presented in this Section 404 Evaluation, I find that the project with the proposed mitigation will not result in unacceptable impacts to the environment.

Carl B. Sciple
Colonel, Corps of Engineers
Division Engineer